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## MACKENZIE VALLEY PIPELINE INQUIRY

IN THE MATTER OF AN APPLICATION BY CANADIAN ARCTIC  
GAS PIPELINE LIMITED FOR A RIGHT-OF-WAY THAT MIGHT  
BE GRANTED ACROSS CROWN LANDS WITHIN THE YUKON  
TERRITORY AND THE NORTHWEST TERRITORIES FOR THE  
PURPOSE OF THE PROPOSED MACKENZIE VALLEY PIPELINE

and

IN THE MATTER OF THE SOCIAL, ENVIRONMENTAL AND  
ECONOMIC IMPACT REGIONALLY OF THE CONSTRUCTION,  
OPERATION AND SUBSEQUENT ABANDONMENT OF THE ABOVE  
PROPOSED PIPELINE

(Before the Honourable Mr. Justice Berger, Commissioner)

Yellowknife, N.W.T.

April 21, 1975.

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PROCEEDINGS AT INQUIRY

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VOLUME XXXIII

CANADIAN ARCTIC  
GAS STUDY LTD.

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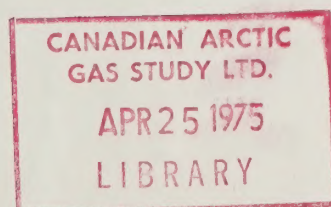


ERRATA

TRANSCRIPT CHANGES BY CANADIAN ARCTIC GAS

<u>VOL</u>	<u>PAGE</u>	<u>LINE</u>	<u>CHANGE</u>
XXIX	3637	24	"Yale" for "McGill"
	3642	15	"Sixalls" for "Sybils" & "Bryson" for "Brice"
	3684	20,22	"cubes" for "tubes"
	3690	29	"thickness" for "fitness"
	3691	24	"They've" for "I've"
	3696	26	"human" for "humid"
	3708	15	"buoyant" for "Point" and "loss of" for "also"
	3709	27	"yield" for "use"
XXX	3717	11	"axial" for "actual"
	3719	2,12,26,27	"axial" for "actual"
	3724	12,26	"axial" for "actual"
	3732	17 & 18	should read "between 1680 and 1690 psig"
	3734	21	"liquids" for "leakage"
	3734	24	"flare stack" for "flow stack"
	3812	14	"70" for "7B"

347  
M835  
Vol. XXXIII







APPEARANCES:

Mr. Ian G. Scott, Q.C.	
Mr. Stephen T. Goudge,	
Mr. Alick Ryder and	
Mr. Ian Roland	for Mackenzie Valley Pipeline Inquiry;
Mr. Pierre Genest, Q.C.	
Mr. Jack Marshall,	
Mr. Darryl Carter and	
Mr. John Steeves	for Canadian Arctic Gas Pipeline Limited;
Mr. Reginald Gibbs, Q.C.	
Mr. Alan Hollingworth	for Foothills Pipelines Ltd.;
Mr. Russell Anthony, and	
Prof. Alastair Lucas	for Canadian Arctic Resources Committee;
Mr. Glen W. Bell and	
Mr. Gerry Sutton	For Northwest Territories Indian Brotherhood and Metis Association of the Northwest Territories;
Miss Lesley Lane	for Inuit Tapirisat of Canada and The Committee for Original Peoples' Entitlement;
Mr. Ron Veale and	
Mr. Allen Lueck,	for Council for Yukon Indians
Mr. Carson H. Templeton,	for Environmental Pro- tection Board;
Mr. David Reesor,	for Northwest Territories Association of Munici- palities;
Mr. Murray Sigler,	for Northwest Territories Chamber of Commerce.





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Yellowknife, N.W.T.

April 21, 1975.

(PROCEEDINGS RESUMED PURSUANT TO ADJOURNMENT)

MR. GOUDGE: Mr. Commissioner,  
I think perhaps we are ready to start. Mr. Genest is  
ready to commence with his construction panel.

MR. GENEST: Mr. Commissioner,  
this is a panel consisting of no doctors; Mr. P.H.  
Dau who has been sworn before, Mr. G.L. Williams  
who has also been sworn before. and a new witness,  
Mr. J.R. O'Rourke, whose qualifications, sir, appear  
in the Appendix A to the summary of evidence which  
has been filed-- provided to the Inquiry, and I  
wonder if I might just follow the resume concerning  
Mr. John Richard O'Rourke, and have him sworn and  
take you through his background qualifications.

THE COMMISSINER: Yes. Do you  
have a copy of the canned notes?

(WITNESS RESUMES, CONSTRUCTION PANEL MARKED AS EXHIBIT I08)

MR. GENEST: And perhaps while  
we are filing Exhibits, Mr. Commissioner, I might also  
tender as an Exhibit, the list of studies and reports  
referred to or being relied upon by this panel, which  
also appears as part of the material as Appendix B.

(LIST OF STUDIES AND REPORTS MARKED AS  
EXHIBIT NUMBER I09)





1 MR. GENEST: I understand  
2 Miss Hutchinson has copies of these. These could be  
3 the next exhibits.

4 Has Mr. O'Rourke been sworn?

5 THE SECRETARY: Yes.

6  
7 JOHN RICHARD O'ROURKE,  
8 Sworn:

9 PHILIP HARVEY DAU, Resumed:

10 GUY LESLIE WILLIAMS,  
11 Resumed:

12 DIRECT EXAMINATION BY MR. GENEST:

13  
14 Q Mr. O'Rourke, I understand  
15 that you, up until very recently at least, were  
16 employed as the co-ordinator, pipeline logistics plan-  
17 ning for the Canadian National Railway Company?

18 WITNESS O'ROURKE:

19 A Yes, sir.

20 Q I understand that you are  
21 in the middle of a change in your duties?

22 A Yes, sir.

23 Q What are you moving to?

24 A I am moving into the  
25 position of manager of Industrial Development for the  
26 Mountain Region.

27 Q And you have a B.Sc.  
28 from the University of Manitoba which was granted to you  
29 in 1950?

30 A Yes, sir.

Q And I understand from 1950



O'Rourke, Day, Williams  
In Chief

1 to 1953, you were engaged in some geophysical explor-  
2 ation and underground survey, and that you commenced  
3 your service with C.N. in 1953, is that correct?

4 A Yes, sir.

5 Q And we have listed on the  
6 Exhibit the various positions you occupied with the  
7 CNR. Now, the longest period of service you had is  
8 as manager of the Customer Research Service, operating  
9 out of Edmonton?

10 A Yes, sir.

11 Q And in that capacity, you  
12 provided technical assistance to freight sales force  
13 in solving shipping problems in the design and  
14 implementation of new transportation concepts, is  
15 that correct?

16 A Yes, sir.

17 Q And I understand that this  
18 involved the application in varying degrees, of many  
19 facets of physical distribution?

20 A Yes, sir.

21 Q From 1970 to the present,  
22 you have been coordinator of pipeline logistics  
23 planning at C.N.R., is that correct?

24 A Yes, sir.

25 Q Could you tell me a little  
26 bit more about what that involves, sir?

27 A It began with C.N.'s  
28 association on the project first sponsored by  
29 Alberta Gas Trunk Line and proceeded into the original  
30 Gas Arctic Group, at which time we provided





O'Rourke, Dau, Williams  
In Chief

1 logistics advice for the proposal that they were  
2 making at that time, for a line from Prudhoe Bay.  
3 Upon merger with the Northwest Project Study Group,  
4 the group then became called Arctic Gas, and we have  
5 continued to provide logistics advice for the system  
6 which includes origins at both Prudhoe Bay and  
7 Richards Island.

8 THE COMMISSIONER: But Mr.  
9 O'Rourke, the C.N.R. was a shareholder in Arctic Gas  
10 throughout, wasn't it? At least from the time that  
11 the two groups merged and Arctic Gas came into being?

12 A We were a shareholder of  
13 the Gas Arctic, even before merger, sir.

14 Q Yes. And Until very  
15 recently, C.N.R. was a shareholder of Arctic Gas?

16 A Right.

17 Q Just -- it isn't now,  
18 though?

19 A No, not now, no.

20 Q Yes.

21 A No, we withdrew about a  
22 year ago.

23 MR. GENEST:

24 Q And I understand, sir,  
25 that your area of responsibility in connection with  
26 this particular project, was to coordinate C.N.R.  
27 studies with reference to the logistics requirements  
28 of the Arctic Gas Pipeline proposal?

29 A Yes, sir.

30 Q And in that capacity,





O'Rourke, Dau, Williams,  
In Chief

1 you gave advice to Northern Engineering Services ,  
2 and the Arctic Gas project?

3 A Yes sir.











Dau, O'Rourke, Williams  
In Chief

1 A Yes sir.

2 Q And were you responsible  
3 and did you oversee the drafting and the statements  
4 that are contained in Section 13-A of the application?

5 A Yes sir.

6 Q If I could turn then  
7 to the schedule, the construction schedule, Mr. Dau,  
8 perhaps you can elaborate on the schedule that you have  
9 laid out. I understand that there have been some chan-  
10 ges and perhaps you can give us a discussion on that.

11 A Fine, sir. First, with  
12 respect to the construction plan. Since filing of the  
13 application the construction schedule as originally  
14 filed has been revised to reflect a one-year delay  
15 in the start of construction activities and startup  
16 of the system. I'm going to ask Mr. Williams to put  
17 on a view graph.

18 Q I'm going to ask him  
19 to focus -- what are we showing on the view graph now,  
20 sir?

21 A Under this revised  
22 schedule, surveying, installation of support faciliti-  
23 es and installation of construction communications is  
24 planned to start in the summer of 1976. The pipeline  
25 right-of-way clearing<sup>to</sup> Commence during the winter of  
26 '76-'77.

27 Q Let me go back just a  
28 moment, Mr. Dau. That is not the plan as filed. The  
29 plan as filed called for pipeline construction to  
30 start the winter of '76-'77, is that correct?





Dau, O'Rourke, Williams  
In Chief

1

2

A That's correct.

3

Q The revised plan calls

4

for a start in '77-'78.

5

A Yes sir.

6

Q And we'll get to what

7

we consider a realistic plan at this date a little

8

later.

9

A Yes sir. That's the

10

machine clearing right-of-way in the winter of '76-'77.

11

Q Now, we got an overlay.

12

A The hand clearing of

13

the right-of-way starts in the summer of '76-'77. The

14

material and equipment required north of Fort Simpson

15

would be shipped by Mackenzie barge from Hay River and

16

stockpiled in the summer of '77.

17

Q That's again according

18

to the revised plan?

19

A Yes sir. Pipeline

20

installation would start in the winter of '77-'78, and

21

continue in southern areas during the summer of '78.

22

Pipelaying would continue during the winter of '78-'79

23

Q Let's go back.

24

A I'm afraid he --

25

Well --

26

THE COMMISSIONER: Well, should

27

we be listening to you, Mr. Dau?

28

A I think you better be

29

listening to me, sir. Why don't you put them all on,

30

Les? Pipe installation would start in the winter of





Dau, O'Rourke, Williams  
In Chief

1  
2 1977-78 and continue in southern areas during the  
3 summer of '78. Pipelaying would continue during the  
4 winter of '78 to '79, to complete the system to the  
5 Mackenzie Delta and during the winter of '79-'80 to  
6 complete the Prudhoe Bay lateral.

7 MR. GENEST: Q Well, that's  
8 '78-'79 to the Mackenzie Delta.

9 A Yes sir.

10 Q '79-'80 to Prudhoe Bay.

11 A That's right. Compressor station installation will start in the summer of  
12 '78 and continue as required.

13  
14 Q '78, your little chart  
15 here says '77. Which is right?

16 A '77 is correct, sir.

17 Q All right, so we should  
18 now stop listening to you and read the chart.

19 A I might add that this  
20 was done Sunday afternoon. Under this schedule gas  
21 deliveries would commence from the Mackenzie Delta  
22 area in the summer of '79 and from Prudhoe Bay in  
23 the summer of 1980. While we are satisfied that the  
24 schedule described is feasible, it's attainability  
25 is dependent upon substantial financial commitments  
26 required for critical items such as barges, tugs,  
27 wharves and communications facilities and logistics  
28 equipment. Based upon presently ascertained lead time  
29 requirements, it would be necessary for such commitments  
30 to be made starting in mid-1975 in order to



Dau, O'Rourke, Williams  
In Chief

1  
2 accomplish this schedule. We are advised by Arctic  
3 Gas that it is unlikely that any such substantial  
4 financial commitments will be made prior to obtaining  
5 the necessary regulatory approvals. In such circum-  
6 stances, then, without reduction of lead times men-  
7 tioned earlier, a schedule for construction of the  
8 pipeline will likely be delayed by a year. North of  
9 60 degrees, that would mean a start of pipe laying  
10 in the winter, of '78 to '79, and a corresponding  
11 shift in the dates for all other scheduled activities.  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25  
26  
27  
28  
29  
30





O'Rourke, Dau, Williams  
In Chief

ALLWEST REPORTING LTD.  
BURNABY 2, B.C.

1 This assumes regulatory approvals  
2 would have been granted by the end of '75, or very  
3 early in '76. Based upon what we now know, <sup>if</sup> regulatory  
4 approvals are not received until early '76, then a  
5 construction schedule for the pipeline commencing  
6 north of the 60th Parallel in the winter of '78-79  
7 appears the most practical.

8 Q Well now then, can we  
9 sum this up from this point in time, what you're  
10 telling us is what appears at this time to <sup>be</sup> the most  
11 likely or feasible schedules?

12 A That's correct, sir.

13 Q And what would that do to  
14 the dates that we've just had on the revised --

15 A Outside of the group up it would  
16 add one year.

17 Q -- schedule?

18 All right.

19 THE COMMISSIONER: Mr. Dau,  
20 forgive me, in the application, the pipe -- in the  
21 application filed in March of 1974, you were to begin  
22 laying pipe in the winter of '76?

23 A Yes, sir.

24 Q Is that right?

25 A '76-77.

26 Q Mr. Horte sent a letter  
27 to the Minister that the Minister sent along to me,  
28 a few months ago, that said that those dates were  
29 to be set back a year. And that would mean that pipe  
30 would commence to be laid in the winter '77, and





1 your presentation here proceeds on that assumption,  
2 except that in the last paragraph that you read, you  
3 are suggesting that <sup>the</sup> laying of pipe really will not  
4 commence until the winter of '78?

5 A That is correct, sir.

6 MR. GENEST:

7 Q And the --

8 A I think I'm correct, there  
9 was a revision in the filing. We changed it from  
10 '76.

11 Q I think that's what Mr.  
12 Commissioner was referring to, the letter to the  
13 Minister.

14 THE COMMISSIONER: Yes.

15 MR. GENEST:

16 Q Extending the application  
17 dates by one year, and what we are now saying, sir,  
18 is that realistically we are probably looking at a  
19 further extension of one year from that, and  
20 that applies to all of the dates we've been talking  
21 about?

22 A That's correct.

23 Q Moving then, sir, to the  
24 details of the construction plan, could you discuss  
25 that with us?

26 A Yes, the chart on the  
27 view graph right now is extracted from 13A, and  
28 first with respect to the chart in the lower right  
29 hand corner, there's a code to indicate the time  
30 schedule in dashed and solid lines and so on, depending



1 upon what year it's --

2 Q It's hard for us to  
3 read that. May be we could ask --

4 A Yes, --

5 Q What chart is it in  
6 Section 13A? Sorry to take up this time, sir, I had  
7 expected to have some time this morning to coordinate  
8 and the airlines didn't cooperate.

9 A It's under the tab schedule  
10 and it's --

11 Q That's Exhibit 66, that's  
12 the Fort Simpson amendment.

13 A And it's about behind the  
14 third pink sheet. It reflects the revisions at  
15 Fort Simpson, of course.

16 As I said, on the lower right  
17 hand corner, first there's a dashed line that indicates  
18 the direction of construction of any particular  
19 spread, and then it goes into four lines that indicate  
20 the time frame in which the construction will take  
21 place. First winter, second winter, first summer,  
22 and third winter.

23 Q That sir, is the first  
24 map that appears in Exhibit 66 under 13-A construction  
25 plan.

26 A At the top of that chart,  
27 there are a series -- well first, the large letters  
28 indicate the spread designations. At the top of  
29 the chart is an indication of the mileage that the  
30 spreads will construct, and for example, if we can go





1 to Spread B, you will note that it is planned to --  
2 Spread B will construct 148 miles in two winter  
3 seasons. Spread B would then move for the third  
4 winter season actually into Alaska, and construct in  
5 Alaska.

6 Some of the spreads, again as  
7 an example would be spread -- pardon me, Spread G  
8 which works in Northern Alberta for a total of 150  
9 miles in two winter seasons. Also, constructs  
10 127 miles in southern Alberta on the delivery lateral  
11 that goes to Kingsgate.

12 THE COMMISSIONER: Sorry, you've  
13 lost me there. Take, for example, Spread G.

14 A Yes, sir.

15 Q You say that they would  
16 move from one location to another, is that it?

17 A Yes, sir. It would work,  
18 the first winter season in Northern Alberta and  
19 construct approximately 75 miles; would then move to  
20 Southern Alberta on the lateral to Kingsgate, con-  
21 struct 127 miles, and move back to the same previous  
22 area, and in the second winter construct another 175  
23 miles. Half of that, I'm sorry, 75 miles, I'm sorry.

24 And then --

25 Q I see, and B would start  
26 south of Mackenzie Delta and then move to the North  
27 Slope, and then back to the --

28 A No, sir, it's what we  
29 call a dedicated spread to the north, because the  
30 distance it has to move is too great to be effective



1 in the south, so it works one winter at its location  
2 shown south of the delta, and is parked during the  
3 summer, works the second winter and then in the second  
4 summer is moved by barge over to the Arctic Coast and  
5 constructs in Alaska.

6 THE COMMISSIONER: I follow  
7 you.





Dau, O'Rourke, Williams  
In Chief

1  
2                   A       This plan is based on  
3 utilizing nine pipeline construction spreads in a  
4 17-month time period encompassing two winters and one  
5 summer construction season to install the 2,137 miles  
6 of pipe necessary for startup deliveries from the  
7 Mackenzie Delta. Five of these spreads work two  
8 winter seasons and one summer season, and four  
9 spreads remain in the north and only work two winter  
10 seasons, and that would be spread B in this case.

11                   This results in 18 winter  
12 spread seasons being available to install the 1,402  
13 miles of pipe planned for winter construction, and  
14 five summer spread seasons being available for 735  
15 miles of summer construction. Winter construction  
16 seasons range from about three months' duration in  
17 Central Alberta to 4 1/2 months' duration in the  
18 Inuvik area, an average of about 3 3/4 months. The  
19 average required winter production from a spread  
20 is therefore about 21 miles per month. Similarly,  
21 summer construction seasons average about 5 1/2 months  
22 resulting in a required summer production of about  
23 27 miles per spread per month.

24                   We have a series of view  
25 graphs that indicate how these spreads move and how  
26 the construction is accomplished.

27                   MR. GENEST:

28                   Q       Sir, do these illustrate  
29 what is shown in the detailed map sheets contained  
30 in the exhibit?

                  A       Yes sir, it's just a



Dau, O'Rourke, Williams  
In Chief

1  
2 different method of presenting them in sequence, and  
3 we thought it might help.

4 The information shown in  
5 red means that that facility is under construction.  
6 If it's shown in black, it means that it is constructed.  
7 This first chart is for the summer of 1976.

8 Q The summer of '76 accord-  
9 ing to what plan, according to what schedule?

10 A The plan that is  
11 presently filed, sir.

12 Q The plan that is filed,  
13 unrevised, so we have to up-date that two years to --

14 A One year.

15 Q One year, '77.

16 A Under the plan that is  
17 presently filed, the summer of '76 there's some  
18 activity related to stockpile sites under construction.  
19 The next one, please, Les.

20 In the winter of '76 you will  
21 note that there is, I believe, one or two more that  
22 come under construction, still only related to stock-  
23 pile sites. In the summer of '77 some of the stock-  
24 pile sites have been completed ready to accept  
25 material by barge, and others are now under con-  
26 struction.

27 Q And they are scattered  
28 throughout there. You have some in the delta, some  
29 in the middle section of the Mackenzie, and some in  
30 the more southerly sections, they are scattered.





Dau, O'Rourke, Williams  
IN Chief

1  
2 A Yes sir. This all  
3 relates to trying to complete the pipeline from  
4 Richards Island to the 60th Parallel in the shortest  
5 time frame.

6 In the winter of '77-'78 there  
7 are now activities relating to the pipe installation  
8 as shown in red on the route.

9 Q Those red lines there  
10 are for pipeline under construction in that season.

11 A Yes sir, in the winter  
12 of '77-'78.

13 Q There is no pipe  
14 completed during that season.

15 A No sir.

16 Q Does it show more  
17 compressor stations or -- I'm sorry, stockpile sites  
18 completed than the previous slide?

19 A I believe so but I  
20 would have to check the individual numbers.

21 In the winter -- in the  
22 summer of '78 the pipeline that was under construc-  
23 tion the previous winter is complete and we have now  
24 started construction activities on the four compressor  
25 stations that are shown as a red square, the numbers  
26 are X-03, M-07, M-11, and M-15.

27 Q Now so the record will  
28 be clear, can we just have a general description of  
29 the areas in which in that season the pipeline will  
30 be complete, just roughly? We see a section just



Dau, O'Rourke, Williams  
In Chief

1  
2 north of Fort Simpson and going to where -- is that  
3 the Willowlake River? Or can anybody help me?  
4 Well at any event south of Fort Norman.

5 A Yes sir, south of Fort  
6 Norman.

7 Q South of Fort Norman,  
8 and then there is more pipeline complete, you go  
9 all the way north of Norman Wells --

10 A To Fort Good Hope  
11 essentially.

12 Q -- to Fort Good Hope.

13 A And generally from  
14 Inuvik to Richards Island.

15 Q Well, doesn't it con-  
16 tinue north of Fort Good Hope?

17 A I guess that's Thunder  
18 River, yes, it would be north of Fort Good Hope, that  
19 would be near Thunder River, the completion of that  
20 section of the pipeline.

21 Q Then you have a section  
22 complete down from the delta to about Inuvik.

23 A Yes sir.

24 Q Right.

25 A In the winter of '78-'79  
26 there is construction activity on the remaining  
27 sections of right-of-way. The compressor stations  
28 are still under construction and we've started acti-  
29 vities on the stockpile sites on the lateral that  
30 goes to Prudhoe Bay.





Dau, O'Rourke, Williams  
In Chief

1  
2 In the summer of '79 the  
3 previously mentioned compressor stations, M-03, M-07,  
4 M-II and M-I6 are complete. We have started construc-  
5 tion on compressor station M-05, M-09, M-13 and M-17  
6 on the mainline from Richards Island to the 60th  
7 Parallel, and also on the two stations, CA-05 and CA-09  
8 on the Prudhoe lateral. The stockpile sites on the  
9 Prudhoe lateral are now complete.

10 In the winter of '79-'80 we  
11 are continuing work on those compressor stations that  
12 I previously mentioned.

13 Q The pipeline then is  
14 at least from the delta essentially completed.

15 A Yes sir,

16 Q You are in the course of  
17 constructing the Prudhoe Bay legs, supply legs

18 A Yes sir, and --

19 Q You're still building  
20 compressor stations.

21 A Yes sir, six of them.

22 In the summer of 1980 there  
23 are additional compressor stations, M-04, M-08, and  
24 M-12.

25 Q Sorry, could you leave  
26 that on just so we can drink that in? The pipeline  
27 itself then is essentially laid to the Alaska border.

28 A Yes sir. All pipeline  
29 installation is complete at this stage.  
30



O'Rourke, Dau, Williams  
In Chief

1 Q And are you in a position  
2 to operate?

3 A Oh yes, we were in  
4 operation from Prudhoe and have been in operation a  
5 year, from the delta.

6 In the winter of '80-81, there's  
7 one more compressor station under operation and it's  
8 NE-16 near Fort Simpson. The reason that one is  
9 de layed is because it has permanent access and it's  
10 not necessary to move material by barge down the  
11 river, so the start can be delayed slightly.

12 In the winter -- or summer of  
13 '81, all of the compressor stations are still under  
14 construction.

15 Q These compressor stations,  
16 these additional compressor stations, Mr. Dau, that  
17 are still in the course of construction at that period  
18 of time, are put there, as I understand it, as a --  
19 as the gas volume, throughput increases?

20 A Yes, sir. There's one more  
21 chart at which all of the compressor stations are  
22 completed, at which time the system from Travaillant  
23 Lake to the 60th Parallel is capable of handling  
24 four and a half billion feet a day, and that's the  
25 last chart in the summer of 1982, they are all installed.

26 THE COMMISSIONER: Just so  
27 that there's no misunderstanding, all of these charts  
28 are on the basis that the present application were  
29 to go forward, but given that last paragraph that you  
30 read earlier, we are to add one year to all the dates





1 appearing on all the charts?

2 A That's correct, sir.

3 Q And add two years to all  
4 the dates in the application as originally filed in  
5 March, '74?

6 A Yes, sir.

7 Q All right.

8 A The construction plan is  
9 based on each spread having sufficient equipment,  
10 supplies and construction labour to achieve a product-  
11 ion rate of one mile per working day of winter  
12 construction and about one and one-quarter miles per  
13 working day of summer construction.

14 Monthly rates are about 30  
15 miles for winter and 38 miles for summer construction  
16 are possible. In the event delays are encountered  
17 during construction, the schedule provides latitudes  
18 so as to allow for construction to be completed within  
19 the same overall time frame, without disruption to the  
20 physical or living environment. It has allowed for a  
21 considerable number of non-productive days.

22 MR. GENEST:

23 Q Could I then discuss with  
24 you, the logistics, that is, as I understand it, the  
25 quantities of material that you will be needing and  
26 how you will be moving them?

27 A Fine, sir. The construct-  
28 ion plan for the project will require the movement  
29 of large quantities of pipe, fuel, compressor  
30 station materials, contractors' equipment and camps,



1 and other miscellaneous items. This particular view  
2 graph shows the tonnage to be transported in Canada,  
3 north of the 60th Parallel, again with the '77-78  
4 start of pipeline installation.

5 Q Again to which in view of  
6 your evidence to day, we should add a year?

7 A Right, sir.

8 Q Fine.

9 A Barge shipments are ship-  
10 ments that go down the Mackenzie River. These ship-  
11 ments go into Hay River by rail and truck and then  
12 are barged down the river. The road shipments are  
13 the shipments that go into Hay River by rail or truck  
14 and then are trucked on the Mackenzie Highway to the  
15 general Fort Simpson area, and are destined to the  
16 area between Fort Simpson and the 60th Parallel, and  
17 the total is some 1.9 million tons.

18 Q That is <sup>of</sup> all materials?

19 A That is all materials,  
20 sir.

21 The second chart lists by years,  
22 the classification of material.

23 Q Perhaps you could leave  
24 us -- perhaps we could read these -- do you have  
25 totals there?

26 A It would be the same as  
27 the -- the total would be 1.9 million tons, sir. I  
28 don't have a total column.

29 Q But the -- I'm taking the  
30 item pipe, for instance, your 409,000 --





1 A It's a little over a  
2 million, 1.1 million tons.

3 Q Tons, in one year, the first  
4 year, 475,000 in the second and 213,000 in the  
5 third year, and we add those up to get the total  
6 tons of pipe, do we?

7 A Yes, m'hmm.

8 Q And you've broken down  
9 your classification of fuel, methanol, compressor  
10 station, contractor equipment, camp -- what comes  
11 under camp?

12 A That's camps for the con-  
13 tractors' work forces.

14 Q What's included in that?

15 A Oh, it would be all the  
16 camp facilities, the generating, water and sewer  
17 plans, the dining rooms, recreation trailers, bunk  
18 trailers, living quarters, office trailers.

19 Q And then you have that  
20 handy classification called "Other " which you have  
21 defined; it includes cement and reinforcing sheets,  
22 block valve assemblies and so on, as set out in the  
23 chart, does it?

24 No?

25 A I beg your pardon, sir?

26 Q I see Mr. Williams shaking  
27 his head.

28 WITNESS WILLIAMS:

29 A That should be steel.

30 Q Cement and reinforcing steel



1 significant.

2 Q The other items are sub-  
3 stantially in absolute quantities?

4 A Yes, sir.  
5 the  
6 And/section from Richards Island  
7 to the Mackenzie Delta crossing near Fort Simpson,  
8 will require about 950,000 tons of material and equip-  
9 ment to be moved in support of the two winter con-  
10 struction seasons that are planned for this section  
11 of the line.

12 As I said, this material will  
13 be moved by rail and truck from origin to the Hay  
14 River-Enterprise area, and then by Mackenzie River  
15 barge to construction stockpile sites.

16 For the section between Fort  
17 Simpson and the 60th Parallel, all equipment and  
18 materials would -- will be transported from Hay  
19 River-Enterprise by Mackenzie Highway and winter road  
20 to the construction stockpile sites, and that was the  
21 total of 247,000 tons that was on the previous chart.

22 South of the 60th Parallel,  
23 all materials and equipment will be moved by combinat-  
24 ion of road and rail transport.

25 All materials and equipment  
26 required for the Prudhoe Bay lateral in Canada between  
27 the Alaska border and Travaillant Lake junction, will  
28 be moved by rail and truck to the Hay River-Enterprise  
29 area, and then by barge to construction stockpile  
30 sites.

The logistics plan for movement of



1 personnel north of the 60th Parallel, has been developed  
2 on the basis that personnel from southern Canada will  
3 be transported from Edmonton by air to the nearest  
4 suitable air strip, servicing a construction camp.

5 Canadian Pacific Limited, C.P.,  
6 and Canadian National Railways, C.N., were retained  
7 in January, 1973 by Northern Engineering. A specific  
8 assignment given to C.P.-C.N. was to analyze the  
9 logistics requirement associated with the construction  
10 of the planned gas pipeline system. It was also  
11 those studies that were incorporated in Section  
12 13.a.3 of the application material.

13 Q I would like to interrupt  
14 here if I might, Mr. Dau, and ask Mr. O'Rourke a few  
15 questions about the logistics discussion that occurs  
16 at Tab 3 of Section 13.a, which is Exhibit 55.

17 THE COMMISSIONER: Before you  
18 do that, Mr. Genest, might I just follow up something?

19 MR. GENEST: Please,  
20 sir.

21 THE COMMISSIONER:

22 Q Mr. Dau, we saw a movie  
23 here on Friday, Mr. Dau about the building of the  
24 CANOL line 30 years ago. Some of the equipment and  
25 some of the material for that line was brought from  
26 Edmonton north by the road and by water, it was  
27 before that railway was built to Hay River. But some  
28 of the material was brought up through Skagway and  
29 then to Whitehorse.

30 Now, there is a highway being





O'Rourke, Dau, Williams  
In Chief

1 built from Dawson to the Mac\_kenzie Delta, the  
2 Dempster Highway. The Arctic Gas, I take it, does  
3 not intend to make use of the Dempster Highway to  
4 supply construction equipment and materials for the  
5 building of the Prudhoe Bay leg, or any other section  
6 of the pipeline? Is that right?

7 A Mr. O'Rourke can probably  
8 respond to this much better than I because he was  
9 involved in the detailed studies of investigating  
10 that route.



Dau, O'Rourke, Williams  
In Chief

1  
2 Q I certainly  
3 want to hear from Mr. O'Rourke, but the answer is -

4 A The answer is  
5 "No", sir. If the interior route were selected,  
6 there would be some use, as I understand it, of the  
7 Dempster Highway.

8 MR. GENEST: Q Well, Mr.  
9 O'Rourke, while that question is fresh in our minds, can  
10 we talk about the use of the Dempster Highway in  
11 your planning.

12 WITNESS O'ROURKE: I'd just  
13 like to qualify that by saying that we have always  
14 recognized that route through Skagway and Whitehorse  
15 and up over the Dempster as a viable route, but be-  
16 cause of the selection of material origins and the  
17 transportation costs that we have been working with  
18 up until now, the route has not been used. But we  
19 haven't rejected it as a route that could never be  
20 used.

21 Q Could you explain that  
22 a little more? You say the selection of costs.

23 A Well, as it stands now,  
24 we are assuming pipe, the major commodity, and fuel,  
25 would originate in Canada and be routed through  
26 Edmonton or at least as far as Edmonton. Now from that  
27 point to get that material up into the Mackenzie  
28 Valley, the more feasible routing is via Hay River  
29 and on.

30 THE COMMISSIONER: Once you've





Dau, O'Rourke, Williams  
In Chief

1  
2 got it to Edmonton, we all have to --

3 A Later on down the road  
4 if for any number of reasons some of that pipe was  
5 to originate offshore, then it's feasible to think of  
6 the pipe coming by ship to Skagway and moving on up  
7 over that route into the lower end of the Mackenzie  
8 Valley, if you will. It's one of the routes that  
9 could be used.

10 Q The panel we had last  
11 week, Mr. O'Rourke, discussed the supplying of pipe  
12 from a number of sources -- Stelco, of course, was  
13 one; but Japanese sources <sup>of</sup> pipe were considered. If  
14 you were to use Japanese pipe then the Skagway-White-  
15 horse-Dempster Highway route would make some sense,  
16 would it, or --

17 A Well, physically it's  
18 a route that can be used, but its use down the road  
19 will be governed by what the various carriers submit  
20 by way of cost or prices for moving materials. If  
21 the combination of ship plus rail or highway beyond  
22 Whitehorse beats out the alternatives, particularly  
23 going into the delta, going around via the Bering  
24 Sea route, then it is a route that we feel could be  
25 used.

26 Q Well, if you go via  
27 Skagway and go by sea to Skagway, then over that rail-  
28 way, the White Pass & Yukon, and then the only way to  
29 get from Whitehorse to Mackenzie Delta is by road,  
30 isn't it?



Dau, O'Rourke, Williams  
In Chief

1 A Right.

2 Q No one has suggested  
3 building a railway there?

4 A No, I didn't intend to  
5 suggest a railway. The reason I said "railway or  
6 highway" at the same time is that they are building  
7 a highway now from Skagway to Whitehorse.

8 Q Oh yes.

9 A Portions of it exist,  
10 but they're finishing the little chunks that are --  
11 that haven't been until now.

12 Q Now, the other aspect  
13 of this is that the C.N.R. isn't in the picture if you  
14 take that route, I assume.

15 A That's right.

16 Q What about the winter  
17 road, the use of a winter road over the Dempster route,  
18 prior to the completion of the all-weather highway,  
19 is that something that has been considered or would  
20 that be considered? What I'm getting at is would the  
21 use of the Dempster route depend on the completion of  
22 the all-weather highway, or could the winter highway  
23 -- the winter road be used?

24 A I can back up and say  
25 that perhaps three years ago we used to consider the  
26 Dempster route with a piece of snow road in the middle  
27 being a route option, if you will, for getting into  
28 Arctic Red and Fort McPherson area. All that's put  
29 on it is the restraint that you could only use the  
30 route in the wintertime and you had to pay the price.



Dau, O'Rourke, Williams  
In Chief

1 But it was a route that we considered to be viable  
2 in physical terms. The planning with the passage  
3 of time now, it looks as if that highway will be done  
4 when the pipeline construction goes ahead, and it  
5 comes back to being a case of economics mainly, in the  
6 selection of the route.

7 MR. GENEST: You mean tariffs  
8 charged by carriers?

9 A Yes, in combination with  
10 this aspect of whether the pipe originates in Canada  
11 or offshore.

12 Q What's the other option?  
13 Let's assume that the pipe originates in Japan, apart  
14 from the Skagway-Dempster Highway alternative, what  
15 would you weigh against it? Where would the pipe go?

16 A You would probably have  
17 two or three options. One would be a direct shot from  
18 Japan into the mouth of the Mackenzie.

19 Q That's going around  
20 Point Barrow.

21 A Via Point Barrow, that's  
22 the method the Aleyska people used for delivering  
23 some of their pipe to Prudhoe Bay. You have another  
24 option of taking the pipe from Japan over to a West  
25 Coast port and we would say Vancouver in this instance,  
26 transferring the pipe from ship to barge, and then  
27 barging up the coast via Point Barrow, which has  
28 also been done for Prudhoe Bay. Then you have a third  
29 option, and again all of these three are options to the  
30 Skagway. The third option would be a ship discharged





Dau, O'Rourke, Williams  
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1  
2 at Vancouver, rail-moved to Hay River, and barge-moved  
3 down the river. So in this sense there are four ways  
4 that we've just talked about for getting pipe into the  
5 Mackenzie Delta.

6 THE COMMISSIONER: Thank you.

7 MR. GENEST: Q And of course  
8 I take it a good deal of that would depend on where  
9 the ultimate source of the material turns out to be.

10 A Right.

11 Q I just wanted to talk  
12 about the Mackenzie Highway for a moment, as discussed  
13 in the logistics section. What use of the highway is  
14 contemplated in the logistics plan that you worked on?

15 A O.K., the plan that we  
16 have evolved to this point in time, based on prices  
17 that we have received from the various carriers, both  
18 rail -- well, not so much rail, but barge and truck,  
19 leads us to conclude that the barging carrier will be  
20 the major one used. In our planning we have left the  
21 assumption stand that the Mackenzie Highway would be  
22 complete to Fort Good Hope by the time we wanted to  
23 start moving materials down-river, and the selection  
24 process, if you will, that picks on the barging route  
25 is based entirely on the cost of moving materials into  
26 the construction stockpile, barging seems to be the  
27 preferred method on the basis of cost.

28 Q So that assuming that  
29 the highway -- well, let me break it down -- up to  
30 Fort Simpson, what does your plan do with reference to



Dau, O'Rourke, Williams  
In Chief

1  
2 the highway?

3 A We use that highway.  
4 That highway exists today and barging really is not  
5 an alternative there.

6 Q Well, it's complementary,  
7 you use both.

8 A It's complementary, but  
9 again mainly on the basis of economics, trucking as  
10 far as Fort Simpson is a better alternative.

11 Q So north of Fort Simpson  
12 where the highway is planned to go, what do you --  
13 what does your plan contemplate using?

14 A Right now we plan on  
15 using barges.

16 Q And the reason for that  
17 is what? Economics or --

18 A Economics only.

19 Q Economics only?

20 A Yes.

21 Q So that even if the  
22 highway should not be built, it will not affect your  
23 logistic plan.

24 A That's right.

25 Q And if it is built, it  
26 will provide extra capacity, is that fair?

27 A It provides little  
28 better alternatives than what we have with barging  
29 only.

30 THE COMMISSIONER: Excuse me,



Dau, O'Rourke, Williams  
In Chief

1  
2 Mr. Genest. Would you mind summarizing for my benefit  
3 what that all meant?

4 MR. GENEST:

5 As I understand it, sir,  
6 the planning calls for use and availability of the  
7 Mackenzie Highway up to Fort Simpson. North of Fort  
8 Simpson the view of the applicant, as I understand it  
9 expressed, adopting the views of our' transportation  
10 consultants, is that the transportation will be by  
11 barge, so that we do not rely upon the presence of  
12 the highway, which is of course not yet constructed,  
13 for transportation north of Fort Simpson. If the high-  
14 way should be in existence, it would provide room --  
15 an alternative but it is not essential. If it is not  
16 built, it does not affect the construction planning  
17 made. Have I summed that up fairly, Mr. O'Rourke?

18 A Yes sir.

19 THE COMMISSIONER: Mr. O'Rourke,  
20 if you are transporting say pipe from Hay River, let  
21 us assume it is brought by rail to Hay River, is it  
22 intended the pipe should be destined, say, for Fort  
23 Simpson, so we have a route where the highway and the  
24 water route are both available to you; pipe destined  
25 for Fort Simpson will be shipped from Hay River by  
26 -- some of it by water and some of it by road or  
27 will the pipe be shipped solely by water, or solely by  
28 road? I'm getting at, are some of these things only  
29 -- can only be carried by water and some only by road,  
30 that kind of thing?

A It isn't quite that.





Dau, O'Rourke, Williams  
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1  
2 There is an interface between what can be hauled by  
3 truck and what can be hauled by barge. The interface  
4 is gauged by costs, and right now that interface falls  
5 in the general Fort Simpson area. Certainly anything  
6 going along the Mackenzie Highway to where the pipeline  
7 crosses and goes south, that is obviously going to be  
8 a truck move; the barges cannot compete with that.

9 MR. GENEST: It's cheaper to  
10 go by truck, is that what you're saying?

11 A Yes.

12 Q Up to Fort Simpson.

13 A In that Fort Simpson  
14 area. The reason I'm having difficulty here being  
15 specific is that without the benefit of competitive  
16 bidding from the two types of carriers, we have to go  
17 by <sup>published</sup> rates, and our best estimates of what they  
18 might bid. The published rates for the barging  
19 operators, they have a price in there now that is  
20 equivalent to about 10¢ a ton mile for delivering pipe  
21 to Fort Simpson; and we know that the truckers are  
22 in very close to that number, and in a competitive  
23 situation they can probably come in a little bit lower  
24 and take some of the traffic that would go to Fort  
25 Simpson. They may even try to cross the river and go  
26 a little bit farther down-river, but as you go down-  
27 river then the barge operators cost, his rates come  
28 quite a bit lower than the trucker.  
29  
30



I am not sure I am making



1 myself -- from a stockpile point over to the highway  
2 and down the highway, say, for ten miles and then on  
3 to the right-of-way, rather than constructing a winter  
4 road all the way. If the highway is not built,  
5 construction plan then, we would have to construct our  
6 own winter roads.

7 THE COMMISSIONER: And the  
8 right-of-way?

9 A Yes, sir.

10 MR. GENEST:

11 Q Yes, perhaps that point,  
12 if I could -- it's a point I only grasped recently.  
13 There are really two divisions of a logistics problem,  
14 as I understand it. There's getting the stuff to the  
15 stockpiles, and then there's moving the stuff from  
16 the stockpile to the actual construction site. Am  
17 I right?

18 A Yes, sir, that is correct.

19 Q And the second movement,  
20 moving from the stockpile to the construction site  
21 is a use to which a contractor will put transportation  
22 services, is that correct?

23 A We neatly divided it on the  
24 basis that it's a logistics problem to the stockpile  
25 site, and then it's a contractor problem from then on.

26 Q So the Mackenzie -- so  
27 so that our logistics problem as far as getting  
28 material to stockpile sites, that's what Mr. O'Rourke  
29 has just been discussing?

30 A Yes, sir.





1 Q And then we have the  
2 additional problem of getting it from the stockpile  
3 site to the construction site?

4 A Yes, sir.

5 Q Where then the Mackenzie  
6 Highway or winter roads or roads along the right-of-  
7 way become the matter under scrutiny?

8 A Yes.

9 Q Does that clear up --  
10 at least --

11 THE COMMISSIONER:

12 No, I apologize for throw-  
13 ing you off your prepared presentation, but it's quite  
14 helpful to me, thank you.

15 MR. GENEST:

16 Q And then Mr. O'Rourke, I  
17 would like to discuss briefly with you, the increase  
18 of the rail network north of 60, which is touched on  
19 at page 13 of Section 3, the logistics plan. What  
20 increase is going to take place north of 60?

21 Perhaps to put you in the  
22 picture, I have a sentence here at page 13, just below  
23 -- above rail equipment that says, "The rail network  
24 will not be increased other than the uprating of  
25 selected sidings and some new trackage associated  
26 with the Hay River-Enterprise staging site (approx-  
27 imately 15,000 feet)." And perhaps my first question  
28 is, the sidings and new trackage, where will these  
29 take place?

30 WITNESS O'ROURKE:

A The selected sidings are



O'Rourke, Dau, Williams  
In Chief

1 all south of 60. The new trackage would be either in  
2 our Hay River yard, or in the staging area and what  
3 we referred to as the Hay River-Enterprise area.  
4 Which would be branch/<sup>-ed</sup>off the railway somewhere, once  
5 the site is chosen.

6 Q And do I understand it  
7 correctly that the arrangement there is that Northern  
8 Transportation, the Crown Corporation, will be looking  
9 after that area?

10 A I believe this is one of  
11 the options that Arctic Gas is working on now.

12 Q Mr. Dau, is that -- what  
13 is your understanding?

14 WITNESS DAU:  
15 A That is my understanding,  
16 sir, yes.

17 Q Then I would like to  
18 discuss the question of river barging. The applicat-  
19 ion materials, again on page 13 state that there are  
20 several rivers in the north on which barging has  
21 been carried out. The applicant has determined that  
22 only the Mackenzie, and to a much lesser extent the  
23 Peel Rivers will be used to support the pipeline  
24 construction, and you depict the Mackenzie River  
25 barging system on Figure 5. Could you just take us  
26 through that briefly, Mr. O'Rourke?

27 WITNESS O'ROURKE:

28 A Yes. As you will note  
29 from the footnote at the bottom of that diagram,  
30 this is an adaptation of N.T.C.L.'s route map. And  
it's intended to show that the portion of their



O'Rourke, Dau, Williams  
In Chief

1 system really that we're concerned with, is the one  
2 that originates at Hay River and continues on down  
3 through the Mackenzie Valley, covering most of the  
4 points that are named or referred to in the applicat-  
5 ion. As far as Inuvik, Fort McPherson and Aklavik.

6 For serving points along the  
7 Arctic Coast, there will have to be a change of navi-  
8 gation -- I don't think that's the right word. A  
9 change in the manner in which the tugs will move  
10 the barges, as you know down-river they push them,  
11 along the coast they tow them. We presently choose  
12 Tuk as the transfer point where they change the style  
13 of operation. This could change though, there are  
14 points in the delta where they can do this without  
15 having to go back to Tuk.

16 The chart also indicates the  
17 sailing distances from Hay River to the points indi-  
18 cated.

19 Q Apart from the position of  
20 the tug, why do we change from pushing to towing?

21 A I can't speak to that a  
22 with any expertise. I just know that this is what they  
23 do. They push them down-river, and tow them along  
24 the coast.

25 Q I will have to ask Mr.  
26 Horte. I have a note from the back somewhere that  
27 says that that's due to wave action and swell, so --

28 You have studied the existing  
29 barge operations on the Mackenzie?

30 A Yes, sir.





O'Rourke, Dau, Williams  
In Chief

1 Q And is the result of these  
2 summarized at page 14?

3 A Under the heading "Barging  
4 Equipment" ?

5 Q Barging equipment, yes?

6 A Yes, sir.

7 Q Could you just summarize  
8 that for us, Mr. O'Rourke? Or if you prefer, read it.

9 A We note that there are six  
10 licenced operators working on the Mackenzie River,  
11 and their combined capacity, we believe to be in the  
12 order of 500,000 tons per season.

13 From that point on, we have  
14 elected to determine Arctic Gas's barging equipment  
15 in terms of the largest tugs and barges that operate  
16 on the river, and for this reason, we choose tug  
17 sizes and barge capacities which are equivalent to  
18 the largest pieces that N.C.T.L. have, which are  
19 larger than any other operator has.

20 Do you want me to --

21 Q Yes, please.

22 A -- read the section on  
23 wharves, or comment on that?

24 Q Well why don't you comment  
25 -- why don't you read it? Perhaps I can read just as  
26 well.

27 A All right.

28 Q I'm presuming that -- go  
29 ahead.

30 A Wharves will be required



O'Rourke, Dau, Williams  
In Chief

1 up for the gas pipeline?

2 A What we have assumed in  
3 our work, we have tried to reflect the fact that the  
4 water level does vary during the period of the navi-  
5 gation season, and as well, the barges are built  
6 with a nominal capacity of 1,500 tons. Our calculat-  
7 ions have been based on, and I can't recall the exact  
8 number, it was either a thousand or 1,200 tons per  
9 barge. Mr. Dau says 1,200 tons per barge, and this  
10 is to produce an average over the sailing season.  
11 The barges will very often handle a good load at the  
12 start of the season, but as the river levels decline,  
13 through August and into September, then we have to  
14 back off on the amount that the barges are loaded.



O'Rourke, Dau, Williams  
In Chief

1 at the locations indicated on the pipeline route maps,  
2 included in Section 2.2 of this particular section.

3 Of these five already exist and  
4 will be upgraded where necessary, to meet the con-  
5 struction requirements. The Mackenzie River  
6 channel will not require improvement for the project.

7 Q How did you -- let me  
8 pause there. How did you ascertain that -- the con-  
9 clusion that you've reached in the last sentence, that  
10 the channel will not require improvement for the  
11 project?

12 A I think I have to say that  
13 that wasn't our conclusion. What we did observe was  
14 -- or what we did was to base the movement of mater-  
15 ials, using the barging system without assuming that  
16 there would be any of the dredging work done that was  
17 being requested by the operators.

18 THE COMMISSIONER: Mr. Goudge,  
19 having regard to that last sentence read by Mr.  
20 O'Rourke, you might make a note of that, because I  
21 think that should be checked out with N.C.T.L. I  
22 keep forgetting the initials.

23 MR. GOUDGE: We have been in  
24 touch with them preliminarily, and we will be in  
25 further touch with them.

26 MR. GENEST: But, well, if I  
27 can just find out a little more.

28 Q The draught of water that  
29 will be taken up by barges transporting your system,  
30 will it be affected by the equipment that it's taking





Dau, O'Rourke, Williams  
In chief

1 Q Now, could you read the  
2 next paragraph please, Mr. O'Rourke?

3 A The present river barging  
4 equipment and additions to it forecast to be in service  
5 by commencement of construction are expected to be  
6 utilized to near capacity by the normal increase in  
7 demand for facilities. Accordingly, the applicant  
8 has assumed that barge and tug requirements for the  
9 project will have to be added to existing systems. This  
10 will require the addition of 48 series 1,500 barges,  
11 and 8 - 4500-horsepower tugs.

12 Q Is that conclusion based  
13 in part on some of your studies?

14 A Yes sir.

15 Q Barging systems, so that  
16 I take it from that that your conclusion was that  
17 without your pipeline the existing system would not  
18 be sufficient to look after your requirements.

19 A You mean -- I think what  
20 you're saying is right. If I can paraphrase it for  
21 myself, what we have assumed is that the system which  
22 includes all of the operators, are adding equipment  
23 to suit the normal demands created by community re-  
24 supplying, new business on the river. They have not  
25 been adding equipment to handle the pipeline materials,  
26 and therefore what we have done is said, "Fine, the  
27 existing system, except for minor exceptions, the  
28 existing system is not available to us for the pipeline  
29 project, therefore how much equipment do we need for  
30 the pipeline?"



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1 That is the number we tried to --

2 Q And you come up with  
3 the number 48 barges and 8 tugs.

4 A Yes.

5 THE COMMISSIONER: Assuming,  
6 that would be the new fleet, whoever supplies it,  
7 whether all of these companies in the business or  
8 whether you -- a new company comes into the field, it's  
9 -- that's the fleet you'd require for purposes of the  
10 gas pipeline construction.

11 A That would be dedicated  
12 to the pipeline only. Yes sir.

13 MR. GENEST: Moving then to  
14 the question of air transport, Mr. Dau, Mr. O'Rourke,  
15 you make the statement or the applicant makes the  
16 statement that, at the bottom of page 14, each con-  
17 struction spread working north of the 60th Parallel  
18 will require sufficient air support to provide for  
19 the transportation of its crew of approximately 800  
20 men from and to Edmonton, and the transport of 80  
21 tons of supplies per spread per month. Have you  
22 been in contact with the carriers to ensure whether  
23 or not that will be available?

24 A Yes sir.

25 Q That type of air support.

26 A Yes sir, we have that  
27 assurance from the principal carrier, Pacific Western  
28 Air Lines, and I think the secondary one that we talked  
29 to was Northward Aviation. Just recently we have,  
30 in a casual conversation, been reassured that they  
would have equipment or would be <sup>quickly</sup> able to get the



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1 required type of equipment the project would require.

2 Q And Mr. Dau, I think  
3 your pipeline route maps indicate the location of  
4 the air strips which are discussed in the second  
5 paragraph under "Air Transport."

WITNESS DAU:

6 A That's correct, sir.

7 Q You have five 6,000-foot  
8 and 16- 2,400-foot air strips, to be constructed.

9 A I believe that's right,  
10 sir. Yes sir.

11 Q Lastly, I wanted to dis-  
12 cuss in that section -- well, perhaps I can just point  
13 it out, at page 18 the alternatives for transportation  
14 systems are discussed, and I think we had a discussion  
15 on these a little earlier today. You have listed there  
16 the water-borne shipments by Point Barrow, Skagway,  
17 Seward, Anchorage -- I don't think we discussed that  
18 one. What is under "B", a combination of water, rail  
19 and road transport, first via Vancouver to Seward-  
20 Anchorage by water? Can you describe that one?

21 Mr O'Rourke.

22 WITNESS O'ROURKE: Seward and  
23 Anchorage are both ports in Alaska which have the  
24 capability of receiving either ships or rail car  
25 ferry-type barges, and they also have the connection  
26 at those points with the Alaska Railroad. What we  
27 were looking at here was an alter-- a routing  
28 alternative that applied mainly to the Alaskan side  
29 of the Prudhoe lateral where you could have a movement  
30 arriving at these ports either on ship or already





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1  
2 loaded on rail cars, to be routed up to Fairbanks and  
3 to be trucked from there over the Aleyeska Highway, to  
4 Prudhoe.

5 Q Now these are alternatives,  
6 I take it, to the plan that you adopted.

7 A Yes sir.

8 Q Which was the one out-  
9 lined earlier. Now have there been any significant  
10 changes in this plan since you made your studies, Mr.  
11 O'Rourke?

12 A I think the most signi-  
13 ficant one that we have experienced relates to the  
14 plan that was filed in March what, '74, and in that  
15 plan there there was only a nine-month period prior to  
16 start of construction for the transportation system  
17 to get the pipe into position. With the change in  
18 schedules, construction schedules now, or project  
19 schedules, we can now add an extra 24 months to that  
20 nine months, to enable delivering of materials. This  
21 has had a good effect on the transportation require-  
22 ments related to pipe, especially.

23 We have picked up the  
24 original -- no, we have everything in our plans now  
25 except the Fort Simpson revision, but that doesn't  
26 affect us very much.

27 THE COMMISSIONER: Could I  
28 just go back to barging for a moment?

29 Q You say, by "you" I  
30 mean Arctic Gas, Mr. O'Rourke, on page 15 under



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1 3.3, "Impact on other projects", you say:

2 "Logistics planning also took into considera-  
3 tion other projects which might be undertaken  
4 simultane\_ously with construction of the gas  
5 pipeline. The large projects that may take  
6 place in Western Canada at about the same  
7 time as the pipeline include construction of  
8 the Mackenzie Delta gas gathering system,  
9 Alberta Tar Sands plants, development drilling  
10 in the Mackenzie Delta and construction of the  
11 Mackenzie Highway. Although smaller projects  
12 have not been specifically identified, the  
13 applicant has estimated that there will be  
14 a 25% annual increase in the volume of goods  
15 shipped on the Mackenzie River barging system  
16 in addition to any increases required to  
17 service this project."

18 You conclude:

19 "More distant projects,"

20 distant in terms of mileage and not in terms of time,

21 "such as James Bay and Arctic Islands Pipeline  
22 and <sup>an</sup> East Coast Pipeline, are not expected to  
23 have a significant impact on the logistics  
24 plan for this project."

25 Well, just so that the barging thing is understood,  
26 you say that for the pipeline alone there will have  
27 to be 48 additional series 1,500 barges, that is  
28 series 1,500, and eight 4,500-horsepower tugs, and  
29 there will in addition to that have to be whatever  
30 barging -- whatever number of barges and tugs are



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In Chief

1 necessary to increase the present capacity by 25%.

2 That's what all of that means, I take it.

3 A Yes sir.

4 Q Now, just before we  
5 leave this other matter that I raised earlier, all of  
6 this means that there will be greatly enhanced activity  
7 at Hay River. But in proceeding with this construc-  
8 tion plan and in developing the logistics for delivery  
9 of pipe and other construction materials, you have  
10 proceeded on the assumption that the largest component  
11 by tonnage, that is pipe, will be manufactured in  
12 Canada. Now were you advised, Mr. O'Rourke, to  
13 proceed on that assumption? You see, let me put this  
14 to you and if you wish to consider it before you  
15 answer it, you are certainly entitled to do that.  
16 What concerns me is that this plan, well-developed and  
17 elaborated, proceeds on the assumption that the pipe,  
18 which is the largest component by tonnage, will be  
19 delivered from within Canada to Edmonton. If -- well,  
20 last week we were told that a number of sources of  
21 pipe were considered all around the world -- Germany,  
22 Italy, Japan, Canada and the United States. Only one  
23 steel mill within Canada was referred to, the Stelco  
24 plant in Hamilton. If the pipe were to be supplied  
25 from any of these other countries, I take it that  
26 would mean that it would be necessary for Arctic Gas  
27 to re-assess this whole construction plan.

28  
29  
30





1 MR. GENEST: Construction, sir,  
2 or logistics?

3 THE COMMISSIONER: Logistics,  
4 excuse me, logistics.

5 WITNESS O'ROURKE:

6 A I don't think I have the  
7 numbers in front of me, but I can reach back in memory  
8 and recall that we did have situations where a per-  
9 centage of the pipe would come from off-shore sources.  
10 And the plans that we put together envisaged, or  
11 provided for some of this pipe moving via the Bering  
12 Sea-Point Barrow route, particularly to points along  
13 the Arctic coast.

14 I think even some of that off-  
15 shore pipe at times used to come in through Vancouver  
16 and end up like, in the system in Alberta.

17 We haven't talked about it, but  
18 I should mention that we have been making use of  
19 a linear programming model, which is simulation technique,  
20 and we have been able to play this kind of "what if"  
21 situation with this model, where --

22 THE COMMISSIONER: That is known  
23 as war-gaming then, is it?

24 A I suppose. On the last  
25 go-round, because of this extended period of time for  
26 delivering pipe, it was possible to get practically  
27 all of the pipe / from the Canadian origin, but it hasn't  
28 always been this way. With the nine months' period  
29 that I spoke of previously, we had to get quite a bit  
30 of pipe from off-shore, because the Canadian producer



1        couldn't supply in that period.

2                    You're correct in saying that  
3        when -- or implying that when it comes down to know-  
4        ing where your pipe is going to originate, this will  
5        have a bearing on the amount of barging equipment  
6        that is required. I can't say where this stands.  
7        It's a matter that Arctic Gas is working on now,  
8        matching as well as they can, their barging require-  
9        ments with their pipe purchasing plans. / <sup>So</sup> Much of this  
10       is governed by the prices of materials that are  
11       offered.

12                   THE COMMISSIONER: Well I'm  
13        sure it is. It's a very difficult task. You see,  
14        we are going to go to Hay River with this Inquiry  
15        soon, I hope, and the people there are very interested  
16        in this pipeline, and the impact on their town and  
17        on the economy of their town is something that inter-  
18        ests them.

19                   Under the present construction  
20        and logistics plan, there will be a very great impact  
21        on Hay River. But that appears in some measure, at  
22        least, to be dependent on the assumption that this  
23        pipe will be supplied from the Stelco plant, and  
24        that considerations of prices quoted and the capacity  
25        of that particular mill will all work out in a way  
26        that enables this plan to go forward.

27                   Can you tell me the Aleyeska  
28        Pipeline, they are now laying pipe in Alaska. That  
29        is steel pipe. Did that pipe come from the mainland  
30        of North America, or did it come from Japan or from



1 some other source?

2 A It all came from Japan.

3 Q And was it simply shipped  
4 either to Valdez or to Prudhoe Bay?

5 A They use a number of  
6 routes. I mentioned earlier that some of it moved  
7 directly from Japan to Prudhoe Bay. They moved  
8 some from Japan to Seattle by ship, transferred it  
9 to barge and took it by barge up the coast to Prudhoe  
10 Bay. They delivered shiploads of pipe to Seward and  
11 Valdez.

12 What was delivered to Seward  
13 went onto Fairbanks; what was at Valdez was stored  
14 mostly there, although they did truck some of it  
15 from Valdez to Fairbanks.

16 There's a point that you may  
17 want to think of in relation to the question you just  
18 threw at me, was that there's an operating limitation  
19 almost in terms of thinking of having off-shore pipe  
20 delivered into the Beaufort, or into the Mackenzie  
21 Delta, and brought back down-river, or up-river, I  
22 should say. Down on the map and up on the river.

23 The river operators can haul  
24 tonnage movements against the current, but they tell  
25 me that they would prefer not to have to move up-river  
26 beyond Arctic Red, somewhere in that area. Once  
27 they hit Arctic Red, they start hitting the ramparts  
28 and it gets pretty difficult, even with empty tows.  
29 And even more so with loaded. They can move loads,  
30 but their preference would be not to come back



O'Rourke, Dau, Williams  
In Chief

1 any farther than Arctic Red, so if a person is think-  
2 king of off-shore pipe and where it would end up in  
3 the system, even if by some set of circumstances there  
4 was a lot of off-shore pipe, it would likely come in  
5 through Vancouver and move via the inland route.

6 THE COMMISSIONER: Thank you.  
7 Carry on, Mr. Genest.

8 MR. GENEST: Thank you, sir.

9 Q I think we were  
10 discussing, Mr. O'Rourke, what events have occurred  
11 since the application materials were prepared, that  
12 would amount to significant changes in the plan, or  
13 in your thinking as to the plan, and you were dis-  
14 cussing first the fact that the pipe delivery period  
15 had been stretched by 12 months, by an extra 12 months,  
16 so you had 21 months of pipe delivery to make, and  
17 is that a plus or a minus factor?

18 A That's a plus factor, as  
19 far as we're concerned.

20 Q It gives you more room  
21 and more time?

22 A Yes, sir.

23 Q And secondly, you have a  
24 statement in the prepared evidence relating to the  
25 suitability of flat cars. Would you read that,  
26 please?

27 A We say in here that there are 400  
28 89 foot flat cars, suitable for transportation<sup>of</sup> pipe,  
29 that have been ordered by Canadian National Railways,  
30 and scheduled for delivery this year.





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In Chief

1                   The relationship or the impact  
2 of that 400 is that our original study, when related  
3 to the nine month delivery period, indicates we would  
4 need in excess of 500 cars for removing pipe. With  
5 the extended delivery period now, 24 plus 9 -- 12  
6 plus 9, 21 months, the 400 cars we feel should be  
7 adequate for hauling pipe. It is no longer the  
8 problem we once thought it was.

9                   Q     Originally, as I take it,  
10 it would have required some early commitment on the  
11 part of Arctic Gas?

12                  A     Yes, that's right.

13                  Q     And that may no longer be  
14 necessary?

15                  A     That doesn't apply any  
16 more.

17                  Q     What about lead times,  
18 Mr. O'Rourke? You considered in your original plan  
19 lead times on certain critical items. What has  
20 happened to them?

21                  A     I think the major one  
22 relates to tugs and barges, and at the time we put  
23 our report together, we determined that there was at  
24 least a 24 month lead time for procuring and getting  
25 this equipment into position to start work at the  
26 start of a normal sailing season.

27                  We could only highlight this  
28 point and draw it to Arctic Gas' attention and then  
29 leave it to them to start looking after the matter,  
30 as I understand it, they have had



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In Chief

1 discussions with the major operator, but I can't tell  
2 you just where the discussions stand.

3 As far as the lead time itself  
4 is concerned, while steel is not the prob\_lem that it  
5 used to be, I think thereare some machinery components  
6 that still have some decent lead times on them.

7 MR. GENEST: I will just take a  
8 moment, sir. Youcalled to my attention that I had  
9 skipped the section on -- in the construction plan  
10 dealing with impact and other projects, and you had  
11 -- I was wondering if there was anything in there.  
12 I had originally considered that perhaps part of a  
13 different phase for further discussion, but --

14 THE COMMISSIONER: No, it was  
15 just the barging figure that caught my attention,  
16 that's all.

17 MR. GENEST: All right, sir.

18 Q Then could I move on,  
19 Mr.Dau, to the item of project control with you?

20 WITNESS DAU:

21 A Yes, sir.

22 As stated in the application  
23 materials, a number of control mechanisms have been  
24 incorporated into the applicants construction plan  
25 which will enable the applicant to maintain very  
26 close control over all construction activities.

27 Their implementation will be  
28 dealt with by later panels. They can be described  
29 as follows: First, the applicant's own personnel  
30 or specially qualified consultants reporting to the



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In Chief

1 applicant will have direct responsibility for a number  
2 of important functions. For example: the direct  
3 supervision of contractors and the detailed planning,  
4 coordination, inspection and testing of the work.

5 Also, the applicant will pro-  
6 vide all camps required to support the construction  
7 activity and will therefore, be in a position to en-  
8 sure that they meet high standards, both in the  
9 facilities provided and in the proper handling of all  
10 waste products.

11 The applicant will also make  
12 direct provision of services related to budgeting,  
13 systems and cost control, right-of-way acquisition,  
14 permit acquisition and allied services, and the  
15 applicant will also be responsible for procurement  
16 and supply.

17 Q If I can interrupt you on  
18 the last one, then Mr. Dau, procurement and supply.  
19 What does that mean, that the applicant will be  
20 responsible for procurement and supply? Does that  
21 mean that it won't be left to sub-contractors <sup>contractors?</sup> or/

22 A That's correct, the --  
23 because of the size of the project and its I gather,  
24 its implication on the entire Canadian manufacturing  
25 capability that we have such very large orders to  
26 place, that they will control that operation them-  
27 selves, rather than handling it through an agent,  
28 for instance.

29

30





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1 Secondly, detailed specifica-  
2 tions will be developed prior to the award of and  
3 incorporated into contracts. They will control all  
4 aspects of pipeline design and installation, including  
5 specifications and instruction on special Arctic con-  
6 struction techniques.

7 Thirdly, the applicant will  
8 prescribe the overall construction schedules, thus  
9 ensuring that pipeline construction in Arctic and  
10 northern areas will be restricted to <sup>the</sup> winter construction  
11 season.

12 Fourthly, land usage by the  
13 applicant and its contractors will be strictly con-  
14 trolled.

15 Fifth, the applicant's  
16 Inspection program will include employment of its  
17 own environmen<sub>t</sub>al inspectors and socio-economic  
18 monitors, in addition to the engineering inspectors  
19 normally employed on pipeline projects. These inspec-  
20 tors will report directly to the applicant with day to  
21 day field control and monitoring authority, and  
22 responsibility.

23 Sixth, the applicant will  
24 retain authority to order a stoppage of work, and  
25 finally, construction worker training programs will be  
26 established that will involve comprehensive orientation  
27 education, and training of construction workers in  
28 such matters as Arctic survival, Arctic construction  
29 techniques, familiarization with the Arctic environment,  
30 and aspects of native and northern culture. These



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1 programs will be dealt with by later panels.

2 Q We move then to the  
3 question of resource requirements, and that's discussed,  
4 I take it, in Section I3.a.5.0 of the application.

5 A Yes sir. That section  
6 contains a graph that illustrates the estimated con-  
7 struction labor requirements. These requirements  
8 peak during the winter construction season. In the  
9 winter prior to pipelaying, a total of about 750  
10 construction workers are required, with 6,800, 7,500  
11 and 5,000 required for the successive three winter  
12 seasons. Summer requirements are less, being about  
13 2,000 for the summer prior to pipelaying, and 5,400  
14 and 2,000 respectively for the succeeding two summers.  
15 These numbers are peak requirements and are predicated  
16 on utilization of nine construction spreads for  
17 pipe installation and up to 16 separate crews for  
18 construction of support facilities and compressor  
19 stations. These figures are for construction forces  
20 only and do not include applicant's supervisory,  
21 inspection and engineering personnel.

22 We understand there was some  
23 question about that and we prepared a chart which is  
24 a copy of the one in I3.a.5.0.

25 Q That's at page 24 of  
26 Section 5 of I3.a. That shows some extra information,  
27 does it?

28 A Yes sir. We have added  
29 our estimates of the field personnel for engineering,  
30 construction management, and owner's forces to that



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In Chief

1 chart. The peak year which was 7,500 approximately,  
2 we have now got about 8,700.

3 Q Now let's see, just so  
4 we don't get confused by dates, at the bottom left-  
5 hand corner you have "Summer of '76" which in the  
6 application material is at page 24, "Summer of '75", so  
7 those dates reflect the first revision.

8 A Yes sir, the currently  
9 filed plan.

10 Q The currently filed  
11 revision, and again in view of your evidence today  
12 we have to update these by one further year. At least  
13 looking at what we consider at this time to be realistic.

14 A Yes sir. I might, if  
15 I could continue, sir, with two more charts here I  
16 can probably describe how we arrived at these estimates.

17 Q Are you going to come back  
18 to this?

19 A Yes, we can.

20 Q All right, because I  
21 haven't had a look at it.

22 A This is the total field  
23 manpower requirements, and the first four items are  
24 the numbers that we added to the chart in the exhibit,  
25 the contractor manpower is the one that's currently  
26 an exhibit. We provided an estimate of the owner's force  
27 in construction.

28 Q That's the layer on top  
29 of the chart, that's how you arrived; in addition to the  
30 construction forces shown in the chart at page 24,



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1 you have shown what additional people will be required  
2 as a super-structure.

3 A It's our estimate of  
4 what is required in the field, sir. That's the owner's  
5 construction forces, operations and maintenance forces,  
6 engineering forces, and construction management forces.

7 Q And the last line is:  
8 "Contractor manpower,"  
9 that is what is already shown at page 24.

10 A That's correct, sir.

11 Q Now let's go back to the

12 --

13 A Bear with me, sir, I've  
14 got one more.

15 Q All right.

16 A May I have the next one?  
17 I picked the peak year, winter of '78-'79, from the  
18 currently filed plan, to try and illustrate the  
19 different skills, disciplines involved in this 1,220  
20 people that are on top of that chart you have in  
21 front of you.

22 Q Well, I'm sorry, Mr.  
23 Dau, the peak year '78-'79, the peak as I see it on  
24 page 24 is '77-'78, and you're taking that up a year.

25 A No sir.

26 Q No?

27 A No, winter of '78-'79.

28 Q Oh, I'm not looking at  
29 the revision.

30 All right. Well, we're





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1 all suffering from this, we'd better all get looking  
2 at the same chart.

3 I have page 24 of the  
4 original filing, and that's been amended, so all I do  
5 to reflect the amendment is to take what's on page  
6 24 and at the top peak, put it '78-'79 instead of  
7 '77-'78; is that right?

8 A Correct.

9 MR. GENEST: All right.

10 THE COMMISSIONER: Well, I'm  
11 sorry, the loose-leaf volume is the up to date appli-  
12 cation?

13 MR. GENEST: No, the loose-  
14 leaf volume, sir, the application, I think it's the  
15 same as mine, is the application as originally filed.  
16 Is that not right?

17 THE COMMISSIONER: But this  
18 has been corrected so that we only add one year to it.

19 MR. GENEST: We only add one  
20 year, that's right, and if we're looking at it  
21 realistically today we add two years. Do you follow  
22 that, sir?

23 THE COMMISSIONER: Yes, but --

24 MR. GENEST: The original plan  
25 started us in the summer of '75; the revised plan  
26 starts us in the summer of '76; What Mr. Dau told us  
27 today <sup>is</sup> that we should really be thinking as we look at  
28 it presently, at the summer of '77 for startup.

29 THE COMMISSIONER: Yes, I  
30 follow that entirely, but so that we are not confused,



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InChief

1 Mr. Dau, you have proceeded really on the basis of  
2 -- throughout your written presentation today, you have  
3 said to us, "Add one year to everything that you have  
4 in that written presentation." And so on this chart  
5 in here we should add one year so that the peak, I  
6 take it, is '78-'79 and not '77-'78.

7 A Yes sir. Unfortunately,  
8 everything I'm presenting today is on the basis of  
9 the revised, as I understand the revised filing.

10 Q Right, as long as we  
11 know that.

12 A Yes.

13 Q And bear it in mind,  
14 so on this graph that Mr. Genest referred to, the  
15 start date instead of summer '75 should be summer '76.

16 A That is correct, sir.

17 Q But you have already  
18 updated this by one year from the original filing in  
19 March '74.

20 A Yes sir.

21 THE COMMISSIONER: No?

22 MR. GENEST: Not the chart  
23 that we've got on page 24 is not updated.

24 THE COMMISSIONER: I wonder if  
25 the coffee is ready?

26 (LAUGHTER)

27 It was supposed to be ready by three.

28 MR. GENEST: It's two minutes  
29 after.  
30



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In Chief

1 THE COMMISSIONER: We'll grapple  
2 with this again after we adjourn for a few minutes.  
3

4 (PROCEEDINGS ADJOURNED FOR FEW MINUTES)  
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(PROCEEDINGS RESUMED PURSUANT TO ADJOURNMENT)

MR. GENEST: Sir, I think we left off with a little confusion which Mr. Dau has confessed to me was his fault. He was under the impression that the chart at page 24 had been updated, which it has not, so I don't know if we're on the same wave length now, but as I understand it, the chart on page 24 shows a start in the summer of '75. If we are going to follow the schedule that was set out in the letter to the Minister, a copy of which was sent to you, it should be the summer of '76, and based on Mr. Dau's present estimate of what is the most realistic schedule, we would start in the summer of '77, so his chart, as I understand it, takes not the last date, but the middle one, the summer of '76, as a starting point. We will have to bear that in mind.

THE COMMISSIONER: You mean the chart that was on the screen?

MR. GENEST: The chart that was on the screen.

THE COMMISSIONER: Yes. Add one year to the chart on the screen?

WITNESS DAU: We probably should put it on again.

MR. GENEST: Right. I think we will see at the bottom right hand corner, summer of '76, and the peak occurs there at the winter



1 of '78-79.

2 THE COMMISSIONER: So that taking  
3 the most recent and realistic view, your peak winter  
4 construction period will be '79-80?

5 A Yes, sir.

6 Q And you will have about  
7 8,700 people that particular winter?

8 A Yes, sir.

9 THE COMMISSIONER: Okay. I  
10 think we had better leave that before --

11 MR. GENEST:

12 Q And what that shows, of  
13 course, is the added layer of supervisory people,  
14 added on top of the original estimates. And then we  
15 carry on, Mr. Dau.

16 A Very well. The peak  
17 requirement for construction equipment will occur  
18 in the first winter construction season, during which  
19 there will be activity in all facets of the project  
20 of construction.

21 Now, the equipment listed in  
22 Section 13.a.5.2 of the application --

23 Q Is that just opposite the  
24 chart we were just looking at?

25 A Yes, sir.

26 Q That's at page 22, the  
27 title page, Construction Resource Requirement ?

28 A Yes, sir.

29 Q At the bottom we start  
30 with 700 crawler-type tractor units?



1 A Yes, that's I understand,  
2 a copy of it there, sir.

3 Q And you're illustrating  
4 that on the slide we've seen?

5 A Yes.

6 Q And that's -- shall we  
7 read that -- 700 crawler-type tractor units, 400 units  
8 of major earth moving and excavating equipment,  
9 300 units of air equipment, that is compressors and  
10 drills, 650 units of welding equipment for manual  
11 welding, 100 units of specialty items, that is bend-  
12 ing machines, crushing plants, et cetera, 350 tractor  
13 trucks, 350 trailer units, that is floats, low-boys  
14 -- what's a low-boy, Mr. Dau?

15 A It's a truck trailer with  
16 a recessed lower bed.

17 Q Flat bed?

18 A Right.

19 Q Tankers, et cetera, 200  
20 trucks in the 5 to 16 ton class and 1,300 trucks in  
21 the half ton to five ton class.

22 THE COMMISSIONER: That --  
23 just looking at the graph on page 24 again, the  
24 -- that equipment that is on that slide will be  
25 required in the first winter construction season,  
26 will it?

27 A Yes, sir.

28 Q And the first winter  
29 construction season on the graph appears to be  
30 '75-76? Now, without getting into this confusion



1 about dates, assuming that this graph is accurate, is  
2 that right, or should it be --

3 A I'm sorry, sir, it should  
4 be the first pipeline construction season, not the  
5 first construction season. This is --

6 Q That would be '76-77 on  
7 the graph?

8 A Right.

9 On your graph, yes sir.

10 Q Yes, this graph.

11 MR. GENEST: You had better look  
12 at our graph, Mr. Dau.

13 A That's correct, sir.

14 THE COMMISSIONER:

15 Q All right, and then we add  
16 our two years to give us the winter of '78-79?

17 A All right. I might add  
18 that the low ground pressure vehicles are not separately  
19 listed on this table or in the Exhibit, and they are  
20 included within the crawler-type tractor units, and  
21 within the truck -- second last truck classification.  
22 These would be the similar to Nodwell units or similar  
23 to Rologen. They are included within those classi-  
24 fications.

25 MR. GENEST:

26 Q These are units designed  
27 to make -- have low pressure on the ground --

28 A Low ground pressure  
29  
30





1 vehicles, yes sir.

2 Q Which reduces the damage  
3 to the ground?

4 A Yes, sir. A significant  
5 portion of this equipment is now owned by or available  
6 to the Canadian Pipeline construction industry,  
7 which at present operates the equivalent of seven  
8 construction equipment spreads, capable of installing  
9 large diameter pipe. The final selection of new or  
10 used equipment for the project will be dependent upon  
11 the condition and the availability of equipment in  
12 service at the required time, and the procurement  
13 times required for acquisition of new equipment.

14 THE COMMISSIONER: You say that  
15 the Canadian pipeline construction industry at  
16 present operates the equivalent of seven spreads.  
17 You mean seven of your projected spreads, is that it?

18 A Probably not precisely the  
19 same, sir. I would define them as large diameter  
20 spreads, you know 36, 42, 48 classifications.

21 MR. GENEST:

22 Q Well, where does that leave  
23 us, Mr. Dau? Does this mean that these are seven  
24 spreads that are available to us?

25 A They currently exist in  
26 Canada, yes sir.

27 THE COMMISSIONER: You mean the  
28 equipment is sitting around in somebody's garage, or  
29 is it at work now, or both?

30 A It would be both, sir.



1 I'm sure some of it is at work at present. I don't  
2 know the precise breakdown.

3 MR. GENEST:

4 Q Could you proceed?

5 A In respect to construction  
6 procedures, conventional winter construction is the  
7 construction technique that has been developed for use  
8 in areas where terrain conditions are such that  
9 construction can be more easily performed when the  
10 surface is frozen sufficiently to provide adequate  
11 support for construction equipment.

12 Q Mr. Dau, I'm sorry to  
13 interrupt you, but my notes say that you had an over-  
14 head which would illustrate the construction materials  
15 and supplies by year, north of 60? Do we have that  
16 or don't we?

17 A I haven't seen that one,  
18 sir.

19 Q Well my note is wrong,  
20 so I will let you carry on.

21 A This technique --

22 Q Perhaps, before I leave  
23 that -- I'm sorry to -- this would have all been  
24 resolved if you had got in on time this morning,  
25 --

26 A Yes, sir.

27 Q I know you'll have some-  
28 thing to say to me later about that, but Figure 2,  
29 which is opposite page 24 of the construction plan,  
30 breaks down your resource requirements, materials and



1 supplies?

2 A right, sir.

3 Q And has there been any  
4 change, apart from the changes in dates, does that  
5 still set out the forecast as to the requirements of  
6 materials and supplies per season per year?

7 A I understand there's some  
8 change in the methanol quantities, resulting from a  
9 revised testing program that was discussed by the  
10 last panel, but other than that, I believe they are  
11 appropriate.

12 Q The methanol -- my  
13 recollection of the last panel is 25,000 tons.

14 Is your understanding different?

15 A I understood that it had  
16 been discussed in the panel last week and that there  
17 was some minor changes, I'm not sure what they are,  
18 but other than that, it's still correct.

19 Q Now, Mr. Dau, does this  
20 figure represent the resource requirements for the  
21 entire Arctic Gas system, including south of --  
22 construction south of 60?

23 Mr. Williams has produced the  
24 slide I was thinking of. That is the slide we  
25 already had.

26 WITNESS WILLIAMS:

27 A Yes, sir.

28 Q Did we already have that  
29 one?

30 A Yes.





1 Q And that breaks down the  
2 -- north of 60 resource requirements?

3 WITNESS DAU:

4 A Yes, sir.

5 THE COMMISSIONER: Could you  
6 leave that for a moment, Mr. Williams?

7 You were looking a moment ago,  
8 Mr. Genest, at the figure 2 on page 25?

9 MR. GENEST: Right.

10 THE COMMISSIONER: And you  
11 were asking, is this limited to Northwest Territories  
12 and Yukon section, and no one's answered --

13 WITNESS DAU:

14 A Obviously not. It's  
15 for the total Canadian.

16

17

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Dau, O'Rourke, Williams  
In Chief

1 MR. GENEST: And that slide, sir,  
2 shows the breakdown, as I now understand it, of that  
3 figure 2 into -- it shows what portion of that will  
4 be dedicated to north of 60.

5 THE COMMISSIONER: Yes, and  
6 well, this particular slide, if this slide that Mr.  
7 Williams is showing now is not in all of this material,  
8 perhaps it could be reproduced this evening and given  
9 to counsel and marked as an exhibit. It's very  
10 helpful.

11 MR. HOLLINGSWORTH: Would it  
12 be possible to get something before the end of the  
13 day's proceedings for cross examination tomorrow?

14 MR. GENEST: I think I can do  
15 that.

16 THE COMMISSIONER: Yes. Well,  
17 I mean, what did I say, I thought I said at the end of  
18 the day's proceedings. Oh I see, well yes, immed-  
19 iately following the session.

20 MR. GENEST: Well then, sir,  
21 I'm sorry, I interrupted you in construction procedures  
22 and you were discussing conventional winter construc-  
23 tion.

24 A Yes sir, we do have  
25 a slide.

26 Q And the conventional  
27 method would apply in non-permafrost areas and the  
28 southern fringe of permafrost areas, would it?

29 A That's right, sir.

30 Q All right.



Dau, O'Rourke, Williams  
In Chief

1                   A     And under this procedure  
2 right-of-way grading is allowed and the working surface  
3 of the right-of-way is kept clear of snow to induce  
4 freezing of the ground as early as possible. Snow  
5 removed from the working surface is piled over the  
6 ditch line to provide insulation to minimize freezing  
7 of the ditch line as much as possible.

8                   That particular slide shows  
9 the 120-foot right-of-way width, indicates the area  
10 where the snow is cleared off the right-of-way, the  
11 working surface for the construction equipment and  
12 the winter road on the right-hand side of the right-of-  
13 way. It's not shown as a road. Can I have the next  
14 slide, please?

15                  Q     Is that where it says --  
16 I'm sorry, let's stop at that one -- natural snow, is  
17 that the winter road?

18                  A     No sir, that's off the  
19 right-of-way. I think the next slide will clear it  
20 up a little.

21                  Q     Let me just understand  
22 something else about that slide. That shows -- well, as  
23 it says on the bottom:

24                  "The conventional winter method which is used  
25 in southern regions."

26                  A     Yes sir.

27                  Q     And which you have told  
28 us is not going to be employed in permafrost regions.

29                  A     Right, sir.  
30



Dau, O'Rourke, Williams  
In Chief

1 Q And what does this slide  
2 show?

3 A This just expands on  
4 that last slide. The ditch is now dug, we can see some  
5 construction equipment working. The winter road or  
6 traffic lane is on the right-hand side. The graded  
7 working surface, the ditch, the spoil bank, and the  
8 stripped organic material is piled on the side in the  
9 event that they use that technique.

10 In this case immediately  
11 prior to ditching, the snow cover is removed over the  
12 ditch line, the ditch dug, the pipe installed, and  
13 backfilled as quickly as possible to minimize the amount  
14 of frozen backfill material. Arctic construction  
15 differs in several ways. The fundamental difference is  
16 that the right-of-way is not cleared of snow, and as  
17 you can see on this slide, there's snow all across the  
18 right-of-way. Rather, snow accumulation is encouraged  
19 over the entire right-of-way. This serves several  
20 purposes. Essentially it promotes a protective  
21 cover over the surface vegetation, and this provides  
22 a base for the construction of a snow road for vehi-  
23 cular traffic, a working surface for heavy construction  
24 equipment, and a separational layer between the vege-  
25 tation and the spoil pile. Another difference is that  
26 grading of the right-of-way is minimized in Arctic  
27 construction. This is because in areas of sensitive  
28 permafrost grading can cause permafrost degradation.  
29 For example, rather than cutting side slopes, filling  
30 techniques will be employed to the greatest extent





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1 possible in order to achieve a level grade. This  
2 particular slide illustrates that point.

3 This is on a sloping section  
4 of the right-of-way and traffic lane, which is con-  
5 structed of the snow road, the working surface has  
6 been levelled for the construction equipment, in  
7 this case snow can be used or borrow material from  
8 the spoil bank or other material. The snow surface,  
9 of course, helps in getting that material back into  
10 the spoil pile, you don't dig down into the vegetation.

11 Q The point is here, I  
12 take it, Mr. Dau, that rather than cutting into the  
13 permafrost to make a grade, you are filling.

14 A That's correct, sir.

15 Q Whereas in conventional  
16 areas, in southern areas you would consider cutting.

17 A Right, sir. Fill  
18 material for these purposes will be snow compacted to  
19 sufficient density to carry construction traffic,  
20 and as I mentioned, if required, snow will be manu-  
21 factured to supplement natural snowfall, and as I men-  
22 tioned when sufficient snow and water are not available,  
23 ditch spoil or borrow may be used. The earth used as  
24 a fill material will be placed over the layer of  
25 snow to provide a separation of the fill from the  
26 ground surface. This will limit the effect on  
27 vegetation during the backfill operation.

28 Now in addition to that we  
29 have one more slide that -- No. 25 -- which is the  
30 other section of the right-of-way which illustrates



Dau, O'Rourke, Williams  
In Chief

1 a trenching machine operating on a snow surface.

2 Q Is a vehical different  
3 than a vehicle?

4 A As I said, sir, we're  
5 getting some new draftsmen.

6 (LAUGHTER)

7 THE COMMISSIONER: May I ask  
8 a question about this slide, Mr. Dau?

9 Q The ditcher is headed to  
10 the right.

11 A Right.

12 Q So the track precedes the  
13 knife or the cutting edge of that thing.

14 A Right.

15 Q So the track remains on  
16 the snow packed on top of the active layer ?

17 A Yes sir.

18 Q I see.

19 A In this case, sir, the  
20 active layer is frozen.

21 THE COMMISSIONER:  
Yes, on yes.

22 MR. GENEST: And the packed  
23 snow, I take it, evens the irregularities of the ground  
24 surface.

25 A Yes in the conventional  
26 winter construction technique, there would be right-of-  
27 way grading to level those irregularities.

28 Q And you don't do that  
29 in permafrost terrain, you use the snow to provide that  
30 even surface?



Dau, O'Rourke, Williams  
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1  
2  
3 A Right, sir.

4 Q Now you were going to  
5 deal with support facilities.

6 THE COMMISSIONER: I wonder if  
7 those five slides might all be supplied to counsel,  
8 Mr. Carter? They are very helpful.

9 M R. GENEST: Should they be  
10 marked, sir, as exhibits, as we go along? Or perhaps  
11 we can take them as a package when they're all ready.

12 THE COMMISSIONER: Yes, I  
13 thought somehow in the fullness of time all of these  
14 things were going to be --

15 MR. GENEST: Yes, I've already  
16 got to file, I think tomorrow, one of the back panel's  
17 slides and so on.

18 THE COMMISSIONER: Well, let's  
19 do it that way.

20 MR. GENEST: All right.

21 THE COMMISSIONER: Excuse me, Mr.  
22 Genest, maybe I'm wrong in saying that because if  
23 counsel used these to cross-examine, it might be better  
24 if they were marked; so that one that was supplied  
25 earlier, classification of material tonnages north of  
26 60, that should be marked, Miss Hutchinson, and then  
27 these five marked in order.

28 MR. GENEST: Marked in order  
29 thereafter. So we'll ask Miss Hutchinson to reserve  
30 the next five numbers.

(CONSTRUCTION MATERIALS & SUPPLIES NORTH OF 60





Dau, O'Rourke, Williams  
In Chief

1 (SLIDE MARKED EXHIBIT 110)

2 (RIGHT OF WAY PREPARATION, CONVENTIONAL WINTER  
3 CONSTRUCTION SLIDE MARKED EXHIBIT 111)

4 (CONVENTIONAL WINTER CONSTRUCTION SLIDE  
5 MARKED EXHIBIT 112)

6 (ARCTIC CONSTRUCTION SLIDE MARKED EXHIBIT 113)

7 (SIDE SLOPE FILLING SLIDE MARKED EXHIBIT 114)

8 (SNOW GRADING SLIDE MARKED EXHIBIT 115)

9 MR. GENEST: You were going  
10 to discuss support facilities, Mr. Dau.

11 A Yes sir, support facili-  
12 ties for the pipeline includes snow roads, winter  
13 roads, borrow facility, wharves, camps, double-jointing  
14 facilities, weight-casting, and fuel storage facilities.

15 Q And you're going to deal  
16 with each of these in turn, are you?

17 A Yes sir. First with  
18 respect to snow roads. Snow or all-weather roads  
19 will be used in all areas of sensitive permafrost in  
20 order to provide access to the rights-of-way, borrow  
21 pits, stockpile sites, and wharves. Snow roads will  
22 be used to provide a traffic lane for construction  
23 traffic along the working side of the pipeline right-  
24 of-way. It is expected that in general snow roads  
25 will be used in areas north of 65 degrees latitude.  
26 However, a final decision on snow road locations will  
27 depend on a detailed assessment of the right-of-way and  
28 access routes to be completed prior to construction.  
29 Wherever possible, snow roads will be located on  
30 existing cut lines and on the pipeline right-of-way.



1 Q What are existing cut  
2 lines, Mr. Dau?

3 A They're the existing seismic  
4 lines in the treed area of Northern Canada.

5 Q Right.

6 A And the type of snow road  
7 to be developed in a given area will depend upon  
8 availability and characteristics of the snow and other  
9 meteorological factors, and the construction method  
10 will vary accordingly.

11 Snow roads will be of two  
12 general types. The first, which is to be used for  
13 all access roads and the traffic lane of the pipeline  
14 right-of-way, will be of sufficient road width to  
15 accommodate two lanes of traffic, and it's approxi-  
16 mately 32 feet, and of a density capable of sustaining  
17 a heavy volume of vehicular traffic.

18 The second type, which is to be  
19 used only as the working surface on the remainder of  
20 the pipeline right-of-way, will generally be of a  
21 lesser density and thickness than the first type, and  
22 will not require as smooth a surface as it will be  
23 used only for slow moving construction equipment.

24 If sufficient snow is available  
25 from any source, example naturally by harvesting it  
26 or by manufacturing it, the snow will be levelled and  
27 may be compacted with low ground pressure vehicles.  
28 In order to increase the density and surface hardness,  
29 to levels required to support traffic, a pulverizer  
30 mixing machine will be used to mechanically process



1 the snow after the minimum of compacted snow cover  
2 exceeds 10 inches in depth. The processing will be  
3 followed immediately by roller compaction. Once the  
4 required surface density and hardness have been  
5 reached, wheeled vehicle traffic will commence.

6 In the event sufficient snow is  
7 not available, or where the processing and compaction  
8 sequence does not produce a sufficiently hard surface,  
9 particularly at curves, the processed snow will be  
10 strengthened by the addition of water to form an ice  
11 cap. An ice cap snow road will normally have approxi-  
12 mately five inches of water penetration in the snow  
13 surface.

14 Mr. Genest may have a few  
15 slides to illustrate one of the research projects we  
16 had on snow roads, and Mr. Williams can do that.

17 WITNESS WILLIAMS:

18 A I think I mentioned earlier  
19 in this hearing that the snow road construction  
20 tests were attempted in 1972 at Sans Sault. These  
21 were not too successful, as the proper equipment was  
22 not available. In addition, snow and ice road tests  
23 were conducted at Norman Wells in 1973. However,  
24 these tests were not started until March, and although  
25 they were reasonably successful, it was felt that they  
26 were not completely valid as they were started so late  
27 in the season, and the critical period is early in  
28 the winter construction season when snowfall may be  
29 light.

30 For this reason, the Inuvik



1 snow road tests were planned to start in October  
2 of 1973. As it turned out, this was a season of very  
3 light snowfall, with only four inches of snow cover  
4 to December the 1st, 1973, and only six inches of cover  
5 by January the 19th, 1974.

6 By comparison, in the previous  
7 winter, Inuvik had about 30 inches of snow cover in  
8 October. The site selected for the test was not far  
9 from the airport at Inuvik, and the town is a few  
10 miles down the road here, off the map. This is an  
11 existing road to a gravel pit here. This is an exist-  
12 ing road to a radio tower on top of the hill here,  
13 so the snow road itself then consisted of this 950  
14 feet leg down here, that drops about 55 feet. A 1,200  
15 foot leg along here that's in fairly flat terrain,  
16 except for a small creek that winds down there, and  
17 is crossed by the road five times, was crossed, and  
18 another section here along the side hill so that we  
19 could better evaluate the problems that might be  
20 encountered in snow road construction on the side  
21 hill.

22 In addition, this map shows the  
23 location of Dolomite Lake here, where snow harvesting  
24 did take place, and you will see that later. I'm  
25 sorry, this leg dropped 55 feet in the 900, but it  
26 had a maximum grade in the middle of it of about 17  
27 percent, and this leg was 1,700 feet long, and not  
28 1,200 as I previously mentioned.

29 The side hill section had a  
30 side slope of about 11 percent, and the side hill





road

1 /section was about 1,100 feet long, so the total road  
2 construction -- constructed was about three-quarters  
3 of a mile. Next, please.

4 Now, we are going to need  
5 some more lights off. Can you see that?

6 THE COMMISSIONER: I can see  
7 it, but feel free to turn the lights out.

8 WITNESS WILLIAMS:

9 A This slide was taken during  
10 the survey work. The cut line along here, and this is  
11 on the side hill section that has a slope in this  
12 direction of about 11 percent.

13 MR. GENEST:

14 Q That's going from the top  
15 right hand corner towards the bottom left hand  
16 corner?

17 A Yes, the line of survey  
18 stakes is along the centre line or the side of the  
19 road, and this is the cross road referred to in this  
20 direction. This shot was taken in September of '73,  
21 before any snowfall at all, and the vegetation cover  
22 is mainly black spruce up to 6 inches in diameter,  
23 willow, alder and birch shrub, and a surface cover of  
24 moss and lichen. Next one please.

25 The clearing operation followed  
26 the survey, and this picture was taken -- the clearing  
27 was started on October the 22nd, 1973, the clearing  
28 was done by hand and only the black spruce was removed.  
29 We left the willow and birch shrubs and what-not  
30 intact. Next, please.



1 This slide is taken after the  
2 completion of the clearing. This is in the section  
3 looking down-hill. Of course two dimensional pictures  
4 don't show topography very well, but there is a slope  
5 down there, and the other section of the road comes  
6 in behind here. The terrain is very hummocky, and  
7 then again it doesn't show that well, but between  
8 the tops of the hummocks and the depressions between  
9 the hummocks, there was as much as two and one half  
10 feet difference in elevation. Next, please.

11 The clearing was completed on  
12 November the 1st, and as you can see, there was very  
13 little snowfall at that time. However, there was  
14 still some active layer left in the soil, and there  
15 was two or three inches of frozen material right at  
16 the surface, then eight to ten inches of thawed  
17 material on top of the permafrost, so this small soft  
18 track unit was used to compact the snow, the little  
19 snow there was, and compress the surface vegetation  
20 to induce frost, and get rid of the remaining active  
21 layer.

22 Q By get rid of it, you mean  
23 get it frozen?

24 A Yes, sir.

25 It was found that by using this  
26 procedure, that the active layer was completely frozen  
27 from one to two weeks in advance of the undisturbed  
28 areas back in the trees. Next, please.

29 This is again the down-hill  
30 section after compaction has taken place, and you can



1 see that there is very little snowfall, and I  
2 think these two chaps here were probably scratching  
3 their heads wondering what to do next. Next, please.

4 So they went to town, to Inuvik,  
5 and they got a road patrol and a front end loader  
6 and a couple of dump trucks, and went to Dolomite  
7 Lake and started harvesting snow off of the lake's  
8 surface. This picture was taken early in December,  
9 and mind you, they could have started this earlier,  
10 at this time there was 22 to 28 inches of ice on the  
11 lake, they could have started earlier, but we were  
12 delayed in trying to solve the problem so it didn't  
13 start until early December.

14 At that time, there was -- the  
15 snow cover on the lake was only about three inches  
16 and in some of the drifted areas, up to six inches.  
17 But as I say, it could have been started earlier, even  
18 though the ice might have been a little thinner, but  
19 they could have worked at least around the shoreline.  
20 Next, please.

21 So this is the beginning of  
22 the snow road construction. The trucks picked up the  
23 snow at Dolomite Lake, and hauled it in to end  
24 dump it along the prepared right-of-way, and this  
25 is a D-6 tractor that was used to spread the snow.  
26 Next, please.

27 This truck is hauling about  
28 16 yards of semi-compacted snow. The process of  
29 windrowing it on the lake and loading it into the  
30 trucks and hauling it that distance does give it





O'Rourke, Dau, Williams  
In Chief

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1 some compaction. This is just a bit of a rough  
2 section here, so the snow depth on the high side  
3 here is about two feet and four feet over here.  
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Dau, O'Rourke, Williams  
In Chief

1  
2 As I mentioned, the trucks  
3 end up the snow, they back up on the road and dump the  
4 snow and it was spread by a D-6 dozer, and this is  
5 a truck that is backing -- a loaded truck that is  
6 backing over that snow that has only had slight  
7 compaction by the D-6 tractor, and you can see the  
8 tires are sinking in two to four inches.

9 This is just another shot  
10 of the dozer spreading snow. These are the uncut  
11 shrubs that I mentioned earlier. You can see that  
12 they did get broken to some extent with the compaction  
13 by the soft-track vehicle. We'll get to that later.  
14 Next, please.

15 This is just another shot of  
16 the snow-spreading. Next, please.

17 This picture is similar to the  
18 previous one except the snow here has had about 24  
19 hours to set up, so it by itself in cold weather it  
20 does gain a fair bit of strength. The truck is hardly  
21 sinking in it at all. Next, please.

22 So after sufficient snow is  
23 hauled to construct the road, this rotary plough  
24 cultimixer was over the road, and it consists in the  
25 back end here of a rotary drum with tines on it that  
26 turns at a speed of about 250 R.P.M. It churns up  
27 the snow, it reduces the voids between the snow particles,  
28 it evens the surface irregularities, and provides a  
29 dense surface. Next, please.

30 This shows the tines on the  
cultimixer when it is up in the raised position. This



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1 machine, by the way, was developed to prepare newly  
2 cleared land for farming operations; but it has been  
3 used for snow-road production by the Canadian Army and  
4 also in Antarctica. Next, please.

5 This just shows the condition  
6 of the road after the cultimixer has passed over. The  
7 width of this particular machine is about 7 feet, so  
8 it took several passes to cover the complete road  
9 which at a minimum top of about 30 feet. The snow on  
10 the lake before harvesting would have a density of  
11 about .25 grams per cubic centimeter. After windrowing  
12 hauling, placing and compaction by the dozer, the den-  
13 sity would be about .35 grams per c.c., and after  
14 running over it with the cultimixer, and also the  
15 timber drag that we pulled over behind this to make it  
16 more level, more smooth and to add the consolidation,  
17 the snow would have a density of about .5 grams per  
18 centimeter, and that's about half the weight of water.  
19 I understand that the Eskimos have more than 20 words  
20 for "snow" and I think generally speaking, it describes  
21 the density of the snow and what use they can make of  
22 it. I don't know how this <sup>material</sup> would work for building  
23 blocks, but I would guess it's pretty fair. Next, please.

24 This is just another picture  
25 of the cultimixer. As I say, it was followed by a  
26 drag of heavy timbers. Next, please.

27 So this is the snow road  
28 layout after construction. This is one of the existing  
29 roads we mentioned here. The other existing road is  
30 here, so this is the downhill section of the main



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1 road along the flat, along the creek bottom  
2 here, and this is the side hill section, and again the  
3 downhill section back through these.

4 Q Excuse me, Mr. Williams.  
5 When would this have been taken, any idea?

6 A Well, this particular  
7 one would be in January, Mr. Genest, because the  
8 main road was constructed in December, and they came  
9 back after Christmas and finished off the side hill  
10 section.

11 Q And was there still a  
12 shortage of snow? Was the snowfall still less than  
13 usual?

14 A Yes sir, it was. As  
15 I say, they came back in January -- I'm sorry I don't  
16 have the date on here, but say it was January 19th,  
17 I think I mentioned earlier that at that time there  
18 was only six inches of natural snow cover in the  
19 bush at that time.

20 A total of 922 truckloads were  
21 required to construct this road, which is about 14,000  
22 yards, and that's at the rate of about 8,000 yards  
23 per mile. Next, please.

24 the long leg This is a section of the snow  
25 road/along the little creek here. This is where the  
26 hill  
27 side /section comes back into the main road. There are  
28 a few brush piles along here that were disposed of at  
29 a later date by putting through a chipping machine.  
30 Next, please.

This is the 90 degree curve





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1 at the bottom of the hill, and they placed a little  
2 bit of super-elevation on the hill. It's higher on  
3 this side than on here, as you get on any conventional  
4 highway, so that the trucks on the trafficability test  
5 moving in this direction could get a run at the hill  
6 without slipping or powering out. Next, please.

7 This is a shot of the side-  
8 hill section with the trafficability studies in progress.  
9 There is about a foot of snow on the high side here,  
10 and four or five feet of snow on the low side because  
11 of the slope in this direction. Next, please.

12 The trafficability tests were  
13 run and this particular truck has 190 feet of 48-inch  
14 pipe on it, it's about a half-inch wall thickness,  
15 as it gives a net load of 22 tons and a gross load  
16 of about 36 tons. Next, please.

17 This is a truckload of  
18 drilling mud on the trafficability test. It has a  
19 load of about 25 tons and a gross load of 39 tons.  
20 This particular vehicle made 200 passes uphill without  
21 chains, and very little deterioration of the road  
22 occurred. It then made another 200 passes with chains  
23 on the tires and the top one to two inches of the  
24 road surface were chewed up a bit. In December and  
25 January about 600 passes of trafficability, 600 -- I'm  
26 sorry, about 1,600 trafficability vehicle passes were  
27 made over the main road, and 1,400 trafficability  
28 passes over the sidehill section. In addition to that,  
29 of course, was the traffic on the road during the  
30 construction period. Next, please.



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1 A very few pot-holes like  
2 this did develop, mainly at or near the curves. Next,  
3 please.

4 Some repairs were made to  
5 these pot-holes. In this case we tried a mixture of  
6 sawdust, snow, and water. Next, please.

7 It was found that with  
8 this snowcrete that was used, that traffic could  
9 resume over the road in about a half an hour. That is if  
10 it had set up. Providing the temperatures were low enough  
11 of course. Next, please.

12 This just shows one of the  
13 passes that had been made of a truck load of mud  
14 in the trafficability test. Next, please.

15 This gives you a little  
16 better idea of the topography. I've been talking about, the  
17 17% grade. That shows it a little bit better, it's  
18 right near the curve and there was four or five feet  
19 of snow on the embankment here because of the super  
20 elevation that was put on it, and you will notice that  
21 the snow does stand up at a fairly steep angle of  
22 repose. Next, please.

23  
24 So also early in December  
25 just prior to starting the snow harvesting on  
26 Dolomite Lake, we tried manufacturing a bit of  
27 snow. This is a standard ski-hill type gun and all  
28 that's required for this operation is a source of  
29 water, and in this picture here is a tank truck,  
30 air compressors, and the hoses of course leading from  
the water and the air to the nozzle. A fine spray is



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1 produced, and of course it turns to snow. The effi-  
2 ciency of these guns is higher at lower temperatures  
3 but snow can be produced at temperatures as high as  
4 36 degrees Fahrenheit. Next, please.  
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1                   This is just a close-up of the  
2 snow gun. Much larger equipment has been developed  
3 and is now available than this one we had to work  
4 with at that time. Next, please.

5                   This is just another shot  
6 of the same thing. The water truck, the air compress-  
7 ors and the snow gun, and there was kind of a gerry  
8 rigged apparatus. We just used the equipment that  
9 was available in Inuvik. The water pump on the  
10 truck was too small, the air compressors were too  
11 small, so we had -- we only got about 50 percent  
12 efficiency on the snow production.

13                   But anyway, a total of  
14 31,200 gallons of water were processed in this manner,  
15 and it produced 12,500 cubic feet of snow in about  
16 31 hours. And we think that it does have an applicat-  
17 ion in the pipeline work, particularly in view of  
18 with the proper equipment, that 20 times the volume  
19 can be produced with one unit, utilizing six discharge  
20 nozzles.

21                   The application would be for  
22 early in the season, such as this, with light snow-  
23 fall or for reinforcing the road at creek crossings  
24 or what-not, because you can vary the water-air  
25 ratio and get pretty well any density of snow that  
26 you want. Next, please.

27                   The traffic-ability studies  
28 were shut down on January the 22nd, and were resumed  
29 on April the 6th to study the spring break- up  
30 deterioration, as the weather turned cold on April



1 the 6th we shut down again, because this proved to  
2 be too early and we resumed the studies, the traffic-  
3 ability studies, on April the 27th when this picture  
4 was taken. Next, please.

5 This picture was taken on may  
6 the 5th and although deterioration is beginning to  
7 show in the road, a total of 96 truck load passes  
8 were made on this date. Next, please.

9 This is the following day on  
10 May the 6th. The ambient temperature was up to 37  
11 degrees Fahrenheit and the rutting and the deterior-  
12 ation accelerated to the extent that the tests were  
13 concluded. Sixty-eight truck passes were made on this  
14 date of May the 6th. Next please.

15 This picture was taken on May  
16 the 12th, and the ruts made in the road here were  
17 caused by a four wheel drive vehicle that had trouble  
18 getting over the roads, getting pretty soft and  
19 the water was starting to run and so forth. However,  
20 in a pinch, this road could be used for soft tracked  
21 vehicles, hauling sleighs for instance, if it became  
22 necessary. Next, please.

23 . This next few pictures were  
24 taken in June of 1974. Northern Engineering botanists  
25 conducted vegetation and active layer depth studies  
26 in 1973, prior to construction and again in July and  
27 September of 1974. Their conclusions during this  
28 period, that although there was a substantial reduct-  
29 ion in the vegetated ground cover, particularly the  
30 evergreen and deciduous shrubs, there was no significant



1 change in their physical characteristics, including  
2 the surface elevation, the organic layer of thickness,  
3 and the active layer of thickness. The lichens and  
4 mosses were not severely affected, and the root  
5 structures of the shrubs appear to be mainly intact,  
6 and should put out new shoots and recover fairly  
7 rapidly. You can see from the picture that it doesn't  
8 look too bad. Next, please.

9 This is another shot in June  
10 of '74. This shows the hummocky terrain a little bit,  
11 the lichen on top of the hummocks. We have a thermister  
12 string in here and a table for the read-out device,  
13 to measure the sub-surface temperature, and a  
14 total of 12 thermister strings were installed. Some  
15 in the disturbed area, and some in the undisturbed  
16 area, to give a comparison of ground temperatures  
17 and active layer thicknesses and so forth. Next,  
18 please.

19 This is another June  
20 picture. This picture doesn't show it very well, but  
21 that little creek that I mentioned runs along here,  
22 and there is a three or four feet drop here,  
23 another thermister string, and a table for the read-  
24 out device. Thank you, I think that is the last one  
25 there.

26 I just have one view graph that  
27 I would like to show. This is an artist's conception  
28 of a snow manufacturing rig. All of this equipment  
29 is in existence. This shows the <sup>multiple</sup> snow gun mounted on  
30 the drive-in vehicle. This shows a large, wide tracked



1 wheeled vehicle. It could be a soft tracked vehicle  
2 just as well. The water pumps and air compressors  
3 here feeding the snow guns and water storage here  
4 and here and this shows this water storage being  
5 drawn by a sled. So with the -- I think we have a  
6 good indication of -- I'm sorry -- the slides and  
7 view graph here indicate two solutions to the problem  
8 of low snowfall in the early part of the season.

9 Another solution, particularly  
10 in the barren tundra regions such as the Yukon Slope  
11 and the Richards Island area, is the use of snow  
12 fence to accumulate snow in the early part of the  
13 season. Quite frequently, the early snow fall is  
14 light, but the wind certainly does blow in these  
15 areas, and the little snow that is available can be  
16 accumulated in this manner.

17 These fences would of course  
18 have to be installed in the fall, preceding construct-  
19 ion, requiring helicopter or all terrain vehicles,  
20 and by all terrain vehicles, I mean the air cushioned  
21 vehicle or the Rologon type.

22 It wouldn't be necessary, of  
23 course, to install snow fences along the complete  
24 spread length of the right-of-way. You might do the  
25 first 15 miles and build the snow road there and  
26 move the snow fences ahead.

27 The question can well be asked,  
28 are these not very expensive and unusual methods of  
29 constructing snow roads, and the answer is that of  
30 course they are expensive compared with other methods





1 presently used in the Arctic, however, at an estimated  
2 cost of 30 to \$40,000.00 per mile, they are a relatively  
3 small percentage of the overall construction costs.

4 It is so vitally important to be able to get an early  
5 winter construction start, that construction spreads  
6 must be furnished with this type of equipment to  
7 achieve the proposed schedules.

8 Hopefully, there will be suffi-  
9 cient natural snowfall to make the moving  
10 of this type of equipment minimal, and that that is a  
11 risk that can't be taken.

12 THE COMMISSIONER: I wonder,  
13 Mr. Genest, if the written presentation that Mr.  
14 Williams read from, could be marked as an Exhibit  
15 and distributed, because it's a little easier than  
16 reading the transcript.

17 MR. GENEST: Oh fine. Mr.  
18 Williams' notes, are they -- were you reading a  
19 script, Mr. Williams? I hadn't seen it, sir.

20 MR. WILLIAMS: Yes, it's not  
21 in very good shape for duplication. There are  
22 scratches and what-not but sure, we could xerox it  
23 tonight.

24 THE COMMISSIONER: Yes, if you  
25 wouldn't mind. That is an easy thing to refer to and  
26 portable, and sometimes the transcripts are not quite  
27 as convenient.

28 MR. GENEST: Right, sir. If  
29 counsel and you will excuse the scratches and notes,  
30 and make allowances for them, I have no objection.



1 I would be glad to do so.

2 Well that then deals with the  
3 subject of snow roads, Mr. Dau. Our next subject, I  
4 understand, is winter trails.

5 WITNESS DAU:

6 A Yes, sir.

7 A number of winter trails pre-  
8 sently exist in the vicinity of the proposed  
9 pipeline. These are unprepared trails that have been  
10 used over a number of years -- a number of winters  
11 by sleigh traffic, or low ground pressure vehicles,  
12 and existing, and new winter trails will be used in  
13 drilling programs, and the preparation of remote  
14 sites that will accommodate communication towers and  
15 equipment.

16 Traffic to such sites will be  
17 minimal, being limited to that required for site  
18 preparation. If a satellite system is used for  
19 communications, the use of these winter trails will  
20 be greatly diminished.

21 Q Then we deal with winter  
22 roads, and can I ask, what's the difference between a  
23 winter road and a snow road?

24 A Well the winter road is  
25 the road we refer to in the conventional winter  
26 construction program, where grading is allowed.  
27 Winter trails have not been graded, it's just the  
28 use with low ground pressure vehicles and sleighs.

29 And winter roads, as I said,  
30 will normally be used in the conventional winter



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1 construction areas, that is non-permafrost areas.

2 In such areas, all temporary access roads and the  
3 right-of-way traffic lane will be winter roads con-  
4 structed by grading the road right-of-way to form a  
5 relatively level road bed, and allowing the frost to  
6 penetrate.

7 Construction traffic will travel  
8 on the frozen ground surface, and winter roads sur-  
9 face will be kept free of snow during the construct-  
10 ion season. Wherever possible, existing roads and  
11 cut lines will be used as winter roads.





Dau, O'Rourke, Williams  
In Chief

1 Q Do you contemplate that  
2 many of these will be used north of 60?

3 A Yes, they will be used  
4 in the non-permafrost areas north of 60, generally oh,  
5 Fort Simpson south, and perhaps some north of Fort  
6 Simpson.

7 Q All right, then we go  
8 to the subject of borrow pits?

9 A Borrow areas consisting  
10 principally of granular material will be required for  
11 the construction of all-weather roads, pads at  
12 compressors, compressor and measuring stations, air  
13 strips, docks, and wharves, and for concrete aggregate  
14 and select backfills. The location of the preferred  
15 borrow sources and alternatives are shown on the  
16 pipeline route maps contained in Section 13-A-2.  
17 Approximately 28 million cubic yards are required in  
18 Canada north of the 60th Parallel. The majority of the  
19 borrow pits will be developed and worked in the winter  
20 season. Most of the access roads connecting the borrow  
21 pits with the haul destination will be winter roads  
22 or snow roads in Arctic construction areas. Those  
23 borrow pits which will be used during all seasons  
24 will have permanent access roads. The whole subject  
25 on borrow pits will be dealt with in Phase 2.

26 Q Our next subject then  
27 is wharves and stockpile sites, Mr. Dau. Would you  
28 proceed?

29 A The construction plan  
30 requires the use of 20 wharves along the Mackenzie



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1 River and the Arctic coast. Final site selections and  
2 designs will be determined as part of the final engin-  
3 eering design in consultation with the Department of  
4 Public Works and established Mackenzie River barge  
5 operators and the communities affected; and our response  
6 to question No.12 of the request for supplemental  
7 information of the Pipeline Application Assessment  
8 Group, we have dealt with design concepts and construction  
9 techniques.

10 Q Moving on then, sir,  
11 to the subject of construction camps, can you  
12 tell us something about those?

13 A Construction camps will  
14 be of various sizes depending on the function they are  
15 designed to serve. For pre-construction activities  
16 such as surveying, materials testing, environmental  
17 research, initial materials and equipment reception,  
18 and small-scale clearing, small camps designed for  
19 10 to 50 men will be used. These camps will generally  
20 be at one location for time periods ranging from a  
21 single day to several months during both the winter  
22 and summer. Depending on the function being served,  
23 the modules will be designed to be transported either  
24 by all-terrain vehicles, helicopters, barges or sleds  
25 for use on snow roads during the winter season.

26 The small camps will be  
27 designed so as to be self-sufficient for periods of  
28 approximately two weeks, and will have self-contained  
29 waste treatment and disposal facilities. For site  
30 preparation, material receiving and compressor



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1  
2 station construction, intermediate size camps which are  
3 designed for crews from 50 to 200 men will be required.  
4 Camps of this type will be in use for periods of up  
5 to a year, serving a variety of functions such as  
6 receiving of materials and equipment, and construction  
7 of wharves, access roads, air strips, and granular  
8 pads. Size of the camp will be dependent on the  
9 functions being served at any given time. It is  
10 anticipated that these camps will eventually form  
11 part of camps devoted to major construction activities.

12 Q Just let me pause there  
13 for a moment, Mr. Day. Do I understand from that  
14 sentence, that as much as possible when you build these  
15 intermediate size camps you will try and build them  
16 in a location where you anticipate a larger camp?

17 A That's correct, sir.

18 Camps of this type will be  
19 served by the river or coastal barge system, permanent  
20 access roads where available, snow or winter roads,  
21 helicopters or fixed wing aircraft if strips are  
22 available.

23  
24 Large camps for major con-  
25 struction activities will be required for staging  
26 points and mainline construction. They will range in  
27 size from 500 to 700 men. These camps will be located  
28 either on major unloading sites or on locations sched-  
29 uled to become compressor station sites. The size  
30 of the camps will vary considerably over the period in  
which they are in use, depending on the functions



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1 being accommodated from time to time.

2 Q Mr. Dau, as to the  
3 proposed location of these, I take it these are shown  
4 in Section 8 in the maps. That's the construction plan,  
5 do we show these sites in Section 13, is it?

6 A Section 13.

7 Q I'm sorry, Section 13,  
8 and that is our sort of present look at where the  
9 general area in which these will be located?

10 A Yes sir.

11 Q May I take you now to  
12 the subject of double-jointing which has special  
13 significance, I take it, in pipeline parlance?

14 A Pipe for the project  
15 will be supplied in 40, 60 and 80-foot lengths. For  
16 40-foot pipe moving through Hay River staging site,  
17 double-jointing will be performed as part of the  
18 inter-modal transfer operation from rail cars to  
19 barges on automatic welding double-jointing racks.  
20 The 40-foot pipe used in areas south of Hay River will  
21 be double-jointed at the various stockpile sites serv-  
22 ing the route. The pipe in 60 and 80-foot lengths will  
23 not require double-jointing.

24 Q Well, there are a couple  
25 of things that I'd like to understand here, Mr. Dau.  
26 What is double-jointing, what's the process by which  
27 you double-joint?

28 A You weld two 40-foot  
29 pieces of pipe together and you have now got an 80-foot  
30 piece.





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Q I see. It's that simple?

A That simple, sir.

Q And when you have 40-foot  
pipe lengths coming to Hay River, there will be double-  
jointing that you've just described<sup>performed</sup> at Hay River?

A At the staging site at  
Hay River, yes sir.

THE COMMISSIONER: Before you  
leave that subject, I don't expect you to answer this,  
Mr. Dau, but when we heard the evidence of the design  
panel last week, it was my understanding -- and I  
recollect it because I put the question that the pipe  
would be in 40-foot lengths, and I think cross-examina-  
tion proceeded on that assumption. You might make a  
note of that, Mr. Goudge, and ask Mr. Scott in due  
course if that affects any of the answers received  
from the design panel because Mr. Purcell said  
the pipe would be in 40-foot lengths, and now it's  
apparent that it will be in 60 and 80-foot lengths as  
well.

A Yes, I remember that.

Q That may have no  
significance, but let's not forget it.

A It depends on the source  
of the pipe. The particular mill, as I understand it,  
sir, on the spiral weld mills, they can make the much  
longer joints where some of the longitudinal weld mills  
are -- some are limited to 40 feet, and I believe  
there are some that can make 60 feet.

Q Well, the matter came up



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1 in connection with stress and strain, of which there  
2 was a great deal last week.

3 MR. GENEST: On the parti-  
4 cipants.

5 Q Well, before we leave  
6 that subject again, do I understand that when the  
7 pipe comes to the ditch it will be either 80 feet or  
8 60 feet -- 80 feet as a result of an 80-foot length  
9 or a double-jointing of two 40-foot lengths, or a  
10 60-foot length?

11 A That is generally  
12 correct. There are instances within, where the  
13 right-of-way is on -- with a reasonable amount of  
14 relief , in other words it's a pretty rugged right-  
15 of-way. It may be more convenient to construct it with  
16 a 40-foot pipe rather than with longer joints. But  
17 that's a decision that will be made in the final  
18 design process.

19 Q Thank you. Then let  
20 me move onto the subject of concrete weights.

21 A Approximately 115,000  
22 five-ton concrete weights are estimated to be required  
23 for the project north of the 60th Parallel. The  
24 weight casting operation will be conducted at field  
25 sites located at stockpile sites, compressor station  
26 sites, or where practical, at borrow pit locations.  
27 These sites will be situated as close as possible to  
28 the point of usage on the pipeline in order to minimize  
29 hauling requirements. Where access to borrow is by  
30 snow road or winter road the required granular material



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1 may be stockpiled in the winter prior to pipeline  
2 construction.

3 Q You don't then anticipate  
4 importing concrete weights prefabricated?

5 A No sir.

6 Q Too expensive?

7 A Well, you'd be moving  
8 all the aggregate a long distance, which is not  
9 necessary.

10 Q Then can I ask you to  
11 tell us something about construction fuel?

12 A Fuel is required for  
13 every phase of construction activity from survey to  
14 final cleanup and restoration operation. Fuel types  
15 will include diesel fuel, gasoline, aviation fuel,  
16 heating oil and propane. For areas north of Hay River,  
17 fuel supply will be transported to storage sites along  
18 the Mackenzie River or Beaufort Sea, primarily by  
19 barge. Where practical, the fuel will be pumped directly  
20 from the barge into storage tanks; where transportation  
21 is required, the fuel will be loaded into tank trucks  
22 and transported to the storage sites. A limited amount  
23 of fuel may be brought in via the Mackenzie Highway.  
24 Where fuel must be stored, a separate area will be set  
25 aside for storage tanks and dikes will be placed around  
26 the tanks. These areas will be constructed in such a  
27 manner as to provide an impermeable barrier. In some  
28 locations this may require the addition of suitable  
29 membrane.  
30

Q Addition to what?





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1 A In addition to the  
2 normal dike that would be constructed of borrow  
3 material.  
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1 Q So you would have a tank  
2 and an area around it with a dyke surrounding the  
3 tank?

4 A Yes, sir and if there was  
5 not suitable borrow material to make it impermeable,  
6 you would use some sort of a membrane so that it  
7 would be impermeable.

8 Q Right. And the purpose of  
9 that would be to contain any spill?

10 a Yes, sir. And small  
11 volumes of fuel must be stored, liquid fuel storage  
12 tanks of the bladder type of up to 1,500 barrels  
13 capacity, will be used. For larger fuel storage  
14 requirements, steel tanks up to 5,000 barrel capacity  
15 may be used instead of, or in combination with  
16 bladder tanks.

17 Q Could you describe what a  
18 bladder tank is?

19 A I understand, Mr. Reid, I  
20 think had a picture, a slide of one when he was here  
21 last week, and I have a note from him that says  
22 that the slide you saw was of a 100,000 U.S. Gallon  
23 tank, and it's a bladder tank. As a matter of  
24 interest --

25 Q I can take that or lump it.

26 A -- that particular --

27 Q What's it made of?

28 A It's a plastic type thing,  
29 with reinforcing material in it. That particular  
30 tank that he showed the slide of, empty it is 54 feet



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1 long and 67 feet wide; when it's filled, it's 53  
2 feet long, 66 feet wide and four feet high. It's  
3 weight empty is 3,700 pounds and 4,800 pounds for  
4 shipping. It rolls up into a package that's about  
5 eight feet by seven feet by six feet.

6 MR. GENEST: Mr. Marshall tells  
7 me it's like a big water bed.

8 A Precisely.

9 Q What is the resistance of  
10 this type of material to breakage, or how secure is  
11 it?

12 A Very secure. Obviously, it  
13 can be punctured with -- you know, if somebody  
14 deliberately set out to do so. They're in use in  
15 -- there are quite a few of them on the North Slope  
16 in Alaska , at Prudhoe Bay as a matter of interest.

17 Propane fuel will be stored in  
18 cylindrical pressure vessels, approximately 900 gallon  
19 capacity, which will be loaded at source and hauled  
20 directly to the storage area.

21 Tankers, either wheel, sled or  
22 track mounted, depending on terrain conditions, will  
23 transport fuel, either directly to construction  
24 equipment or to tank storage facilities. Loaded pro-  
25 pane cylinders will be hauled directly to the jobsites  
26 and upon use empty cylinders will be returned to the  
27 storage area.

28 Q Well, that, I think con-  
29 cludes our description of the support facilities that  
30 you will need. I would like to move on next, to



1 no one's surprise, to a description of steps in the  
2 construction of a pipeline and its related facilities.  
3 Would you proceed with that?

4 A Yes. The main steps  
5 required in the construction of the pipeline are  
6 surveys, clearing, grading, stringing, bending,  
7 ditching, welding, coating and wrapping, lowering in,  
8 tie-in, buoyancy control, backfill, crossing of  
9 rivers, streams and roads, installation of valves,  
10 testing, clean-up and restoration, and revegetation.

11 The survey step --

12 Q You're going to -- just  
13 let me -- you're going to take us through each of  
14 these, are you, Mr. Dau?

15 A Yes, sir.

16 Q Good. First is the survey  
17 step?

18 A Yes, the survey step in-  
19 cludes four phases of location, construction, as-  
20 built and legal survey. It is now planned to estab-  
21 lish control by use of orthophotomosaic mapping,  
22 utilizing this control the location survey will  
23 locate boundaries of all facilities sites and rights-  
24 of-way.

25 Q Can you tell us anything  
26 about what is orthophotomosaic mapping?

27 A Yes, within the application  
28 we provided mosaics of the route, which are -- I  
29 believe were at a scale of about 2,000 feet to an inch.  
30 Those were uncontrolled mosaics, and the scale varies





1 slightly over the length of the mosaic. In an ortho-  
2 photomosaic, the scale is controlled, so that you can  
3 scale directly from the mosaics, and the -- excuse me,  
4 and the contours are drawn on the mosaic, so that you  
5 have a map that provides sufficient control in  
6 length on elevation to locate your facilities.

7 Construction survey crews  
8 will work in conjunction with mainline construction  
9 crews. Prior to clearing, the sites or right-of-way  
10 for all facilities will be located and flagged. Both  
11 sides of the pipeline right-of-way will be flagged  
12 prior to the clearing operation.

13 Prior to ditch excavation, the  
14 ditch centre line will be flagged.

15 Q Flagged means what I  
16 take it would mean to me is you just plant flags or  
17 stakes or --

18 A Yes, sir.

19 During construction of any per-  
20 manent facility, a survey will be made to record the  
21 actual as-built location of all pertinent items.  
22 The as-built survey crews will be scheduled to work  
23 closely with the construction activity, so that all  
24 pertinent data are recorded prior to burial of any  
25 pipeline, or other underground facility.

26 Q Could I ask you, Mr. Dau,  
27 what's the purpose of keeping this accurate record?

28 A Just so you know where  
29 everything is, in the event you have to go back and  
30 relocate it at a later time.



1 Q To what degree of accuracy,  
2 within how many feet, for instance, if you -- is this  
3 accurate?

4 A It would be more accurate  
5 than within a foot. I think you're referring to trying  
6 to locate it with relation to some permanent survey  
7 monument. It could be quite precise in some instances.

8 Q And when you say the as-  
9 built location of all pertinent items, what kind of  
10 items have we got in mind here?

11 A Oh, the pipe, valves, drain-  
12 age structures, within the station itself, the locat-  
13 ion of all fittings. Electrical conduit that's buried  
14 and things like that.

15 Q All right.

16 A And finally, a legal sur-  
17 vey will be performed as required in accordance with  
18 the regulations of the Surveyor-General of Canada.

19 Q Can we move on then to  
20 a clearing operation?

21 A The clearing operation  
22 involves the removal of trees and brush, and in non-  
23 permafrost areas, the operation will normally be  
24 carried out using bulldozers suitably equipped with  
25 a Vee or Rome-type cutting blade attachments and  
26 protective cabs for operators.

27 Brush and timber will be cut  
28 off just above ground surface. Workers with hand  
29 power saws and axes will be used for clearing when  
30 frost has not sufficiently penetrated the ground to



1 support heavy equipment, or when machine clearing  
2 would produce detrimental environmental consequences.

3 Marketable timber will be cut  
4 and stacked in areas along the edge of and contiguous  
5 to the right-of-way or site. Non-marketable timber,  
6 slash and brush which is not desired by others will be  
7 piled and burned. Where required, timber will be  
8 used as rip-rap along the pipeline right-of-way.  
9 Such timber will be limbed and topped prior to  
10 placement.

11 Special precautions are required  
12 in Arctic construction areas, and as a consequence,  
13 it is expected that hand clearing will be used more  
14 extensively. Further, conventional clearing techniques  
15 will be modified as follows: First, all dozer blades  
16 will be equipped with shoes to prevent cutting into the  
17 terrain, and secondly, particular care will be taken  
18 to select burning sites, having regard to degradation  
19 of permafrost. And if satisfactory sites are not  
20 available, burning sleds will be used.

21 Q Then we are onto stringing  
22 and bending operations, are we?

23 A Yes, sir.

24 In the stringing operation,  
25 pipe will be transported to the right-of-way by  
26 trucks or all terrain or track vehicles using winter  
27 roads from stockpiles, or where the supply schedule  
28 and location permit, directly from rail cars. That  
29 generally would be south of the 60th parallel, in  
30 fact it would be south of the 60th parallel.





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1 Pipe will be unloaded directly  
2 at the point where it is to be used.

3 In the bending operation, pipe  
4 will be bent as required, to fit the contour of  
5 the ditch bottom. All bending will be performed in  
6 the field, using the cold stretch method, except where  
7 shop fabricated bends are supplied.

8 MR. GENEST: This may be purely,  
9 I'm probably the only person in the room who doesn't  
10 really understand what the stringing operation is.

11 Q What is it?

12 A It is to take the piece of  
13 pipe from the stockpile site out to where you want  
14 to install it.

15 Q That's called stringing?

16 A Yes.

17 THE COMMISSIONER: So that it's  
18 strung out beside the ditch?

19 A Yes, sir.

20 MR. GENEST: Right.

21 Q And did I stop you from  
22 talking about the bending operation?

23 A No sir, I finished that one.

24 Q Thank you. Let's go to  
25 ditching.

26 A In the ditching operation,  
27 the ditch will be excavated to a minimum width of six  
28 feet, and to a depth sufficient to provide for at  
29 least 30 inches of cover. In areas where filling has  
30 been used, the 30 inches will be measured from the



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1 original ground surface. Detailed locations where  
2 extra depth ditch is required for buoyancy control  
3 or frost heave protection or drainage and erosion  
4 control, will be determined in the field.

5 As a result of these consider-  
6 ations, the average depth of burial from the original  
7 ground surface to the top of the pipe, will be  
8 approximately four feet. Where possible, wheeled  
9 ditchers will be used. In areas where wheeled ditchers  
10 cannot be used, some combination of blasting, ripping  
11 and wheel ditching or back-hoeing will be used.

12 Q I understand, Mr. Williams,  
13 I see that Mr. Dau's voice is rapidly cracking, that  
14 you have some relief in the form of a slide present-  
15 ation?

16 THE COMMISSIONER: I think we  
17 will take another 5 minute break, Mr. Genest, if you  
18 don't mind?

19 MR. GENEST: Not at all, sir.

20 THE COMMISSIONER: And then we  
21 will carry on til six after that.

22  
23 (PROCEEDINGS ADJOURNED)  
24  
25  
26  
27  
28  
29  
30



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(PROCEEDINGS RESUMED PURSUANT TO ADJOURNMENT)

MR. GENEST: Q Mr. Williams is now going to make his presentation on ditching, Mr. Commissioner.

WITNESS WILLIAMS: Mr. Commissioner, before we get into a bit of ditcher development, <sup>like to</sup> would show a few slides that are general interest slides with respect to pipeline construction, things that have come up during the hearing and things -- some of them that you have mentioned yourself, <sup>we thought</sup> we put a few on just for that reason.

This is conventional winter construction. We borrowed these slides and I think it's in Northern Alberta, 24-inch pipeline construction job. Here you can see the snow and the trash piled over the ditch line to retard frost penetration.

Q What do you refer to as "trash"?

A Oh, clearing debris.

Q Right.

A Mr. Genest, limbs and whatnot that are left over from the clearing operation.

THE COMMISSIONER: So that is piled on top of the -- what will become the trench.

A What will become the trench to keep the frost from penetrating to make the excavation easier. We should add that in muskeg terrain this procedure would not be used. The snow <sup>line</sup> will not be piled over the ditch; rather the snow would either be compacted or dozed off to the side to



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1 encourage frost penetration into the muskeg terrain  
2 to give it sufficient frost thickness to support the  
3 heavy construction equipment, and this pipe, Mr.  
4 Genest, has been strung out along the right-of-way.  
5 Here is another truckload of 24-inch pipe coming down  
6 the winter road that has been graded fairly smooth  
7 on the side. Next, please.

8 This is the actual pipe-  
9 stringing operation, the side boom has lifted the  
10 joint of pipe off the truck and is placed again beside  
11 the snow that it's piled over the line that will  
12 become the ditch line. Next, please.

13 So this then is after the  
14 snow and debris has been pushed aside. Previously it  
15 was here along the ditch line. It's been pushed out  
16 to the side sufficiently far to allow the snow -- the  
17 soil, excavated soil to the <sup>pile</sup> spoil and I think last  
18 week, Mr. Commissioner, the question of sequence timing  
19 between welding and ditching came up for discussion.  
20 In conventional summer construction,  
21 it is the general practice to excavate the trench  
22 ahead of bending and welding operations. Inconven-  
23 tional northern winter construction it's the general  
24 practice to bend and weld the pipe ahead of the ditch  
25 excavation, and in this case the pipe here is welded,  
26 it's up on skids, and it's ready to go -- I'm sorry --  
27 the excavation, ditch excavation will proceed, the  
28 pipe will be externally coated and put in the ditch  
29 as quickly as possible and backfilled before the spoil  
30 pile gets a chance to freeze into unmanageable lumps.





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1 In permafrost, in the continu-  
2 ous permafrost region the spoil material will be frozen  
3 so we won't have that problem of the spoil freezing in  
4 the spoil mound. In that case we would probably ditch  
5 ahead of the pipe welding, and wrapping, ahead of  
6 the bending, welding and coating, because if you  
7 construct the ditch first, then you can bend the pipe  
8 accuracy and you get better  
to a better/conformation in the bottom of the trench.  
9 Of course, in the continuous permafrost zone, when you  
10 construct the trench ahead of the bending and welding,  
11 there's a chance that it might, at least partially  
12 fill up with snow. But we feel that a snow blower  
13 can be developed to get the snow out of the trench  
14 before lowering the pipe in. Next, please.

15 This is just a conventional  
16 ditching machine working in the summertime on the  
17 prairie. Next, please.

18 I think questions have come  
19 up with respect to pipe bending. This is a pipe  
20 bending machine, bending, I think, a piece of 36-inch  
21 pipe. The machine has a segmented shoe on the bottom,  
22 another shoe on the top, and these segments are  
23 hydraulically controlled to bend the pipe. The side  
24 boom carries the pipe and places it in the machine.  
25 The operator pulls a bend in the pipe at that location.  
26 AT one spot he might pull up to 1 1/2 degrees total  
27 deflection in the pipe, then the side boom pulls the  
28 pipe forward a foot or two, and they put in another  
29 half to 1 1/2 degrees deflection and so on, until  
30 the pipe has been bent to the configuration of the



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1 -- either the ditch bottom or if the ditching follows  
2 the bending operation, it would be done to conform  
3 with the surface terrain above the pipe centre line,  
4 and you can get a fairly smooth bend in the pipe  
5 by doing it in segments down the pipe. Next, please.  
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1 This just shows manual welding  
2 of the pipeline in winter conditions. Next, please.

3 This is a picture of a coating  
4 machine, taping machine in this case, which is taken  
5 from the wrong end to show the coating, but I put it  
6 in to show that the pipe has been bent here to conform  
7 with the bend at the top of the hill. Next, please.

8 Okay. Now getting back to ditch-  
9 ing machines, this is a conventional ditching machine  
10 that was used mainly on the prairies for pipe up to  
11 36 inch diameter. This size is still in existence,  
12 of course, but larger machines have been developed,  
13 and you notice that this particular machine can be  
14 transported on one low-boy. This is a low-boy, Mr.  
15 Genest.

16 MR. GENEST: Thank you.

17 WITNESS WILLIAMS:

18 A Next, please. This is the  
19 machine that was used to excavate the trench at Sans  
20 Sault that you saw pictures of a week or two ago. It  
21 was developed by Banister Construction. In trans-  
22 porting this machine any great distance the wheel  
23 has to be taken off and the machine transported in two  
24 separate units. Next, please.

25 This is a picture of that same  
26 machine operating in the summer time on the prairie.  
27 I think it has a capability of five and one half  
28 feet wide, and maybe nine feet deep. Next, please.

29 This is the same machine, work-  
30 ing at a little more difficult terrain. Next, please.





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1 And this is the new generation  
2 Banister machine, the one that has come out since, or  
3 after the one I showed previously. This machine has  
4 a total weight of about 200,000 pounds. The wheel  
5 has a weight of 70,000. It has a diameter of about  
6 17 feet, and it must be transported in two pieces.  
7 Next, please.

8 This shows the wheel loaded on  
9 a low-boy that is made or constructed to take that  
10 particular wheel. Next, please.

11 This is another new generation  
12 machine. It has a total weight of about 280,000  
13 pounds. The wheel weighs about 130,000 pounds. It  
14 has a total horsepower capability of about 1,200  
15 horsepower. It was developed by the Henuset Brothers  
16 in Calgary, and <sup>it</sup> along with the previous ones you saw  
17 we used in a ditcher test at Churchill. Next, please.

18 This is another new generation  
19 machine put out by Barber-Greene. We tested this  
20 machine at Gillam, but found it wanting. We under-  
21 stand that they are making some modifications to it.  
22 Next, please.

23 And this is the same machine  
24 operating on the prairie. It works very well there.  
25 Next, please.

26 So, the first ditcher testing  
27 that we did was in 1971 at Sans Sault. You have seen  
28 some pictures of that. What we learned there was that  
29 we probably needed larger machiners and we certainly  
30 needed better ditching teeth. The next test was



1 conducted at Churchill, Manitoba in 1973. The reason  
2 we went to Churchill because we would have much  
3 rather ditched in the Fort Simpson area, but we looked  
4 and did quite a bit of drilling and we couldn't find  
5 a suitable site in permafrost in the material that we  
6 wanted to test the machine in, and at that particular  
7 year, the winter road wasn't constructed up to Norman  
8 Wells, so it was almost impossible to get there, and  
9 because there is rail facility to Churchill, we went  
10 in and did some drilling there, and it looked pretty  
11 promising, but it turned out to be very, very diffi-  
12 cult, because it had great large boulders, the size  
13 of this table that didn't show up in the soils  
14 drilling program.

15 So then we moved to, the same  
16 year we moved the equipment to Gillam, Manitoba, into  
17 permafrost that is fairly warm, and it is at the  
18 other end of the scale. It was really too easy but  
19 the test at Gillam did show that we still had a real  
20 difficult tooth problem, although the machines, the  
21 new generation machines looked like they were getting  
22 up to the size that was required for this project.

23 After Gillam, the following  
24 year we tried, that was in the spring of '74, we  
25 tried testing some new teeth in a frozen gravel pit  
26 in Edmonton, and that wasn't too successful. In  
27 the fall of '74 we did some testing in a shale pit  
28 at Seebe, just west of Calgary, and it looked like we  
29 had a good summer testing area and we went back in  
30 there again, this winter. That would be in January or



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1 February of '75, and did some more testing there, and  
2 then moved to a frozen gravel pit in Calgary. Next,  
3 please.

4 So this is the machine used for  
5 the tests at Sans Sault. It's smaller than the new  
6 generation machine. Next, please.

7 This is a larger machine being  
8 unloaded at Churchill, Manitoba. Next, please.

9 This is at the test site in  
10 Churchill. This is the Banister machine that has a  
11 covering over, they are welding on some pockets  
12 for different style teeth. It was very cold and bitter,  
13 windy weather when this was conducted. Next, please.

14 And this is ditching at Church-  
15 ill, extremely difficult till soil conditions at  
16 Churchill. We really couldn't get much production out  
17 of these machines without blasting ahead of it, but  
18 the till in this area we think is more difficult than  
19 what we are going to find along the Mackenzie Valley.  
20 Next, please.

21 This is the ditch wall at  
22 Churchill - - it's just like concrete, and the small  
23 teeth you notice here, some are wearing, breaking  
24 pretty badly. Next, please.

25 This is another shot of the  
26 ditch wall at Churchill. Next, please.

27  
28  
29  
30



This is at Gillam where <sup>we</sup>men-

These are the teeth, the style of teeth that were used at Churchill and Gillam these are standard tests, ditching shapes. We tried different metallurgical properties that didn't work too well. These are a cylindrical tooth with a carbide tip. Next, please.

This is the style of break  
that we got at Churchill. We tried hard-surfacing  
some of them, they stood/<sup>up</sup> a little bit better but  
not much. Next, please.

And the carbide, this is  
a new carbide chip tooth, and they wore pretty badly  
also. Next, please.

This is the machine set up for the test at Edmonton. Here we tried much larger teeth and so fewer are required, but we found that in both the alloy and the metallurgy in the teeth and the shape were not right, and this test wasn't too successful. Next , please.

These are two samples of the new teeth that were developed for our test in 1975. This one was developed in Sweden and it has metallurgical properties that appear to have great promise. This tooth was manufactured in Canada and it has a new





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1 hard casing technique that we also think looks very  
2 good. Next, please.

3 This just gives you the size  
4 of the tooth. It has about a 10-inch cutting shank  
5 on it, a cutting tip on it, and another four or  
6 five inches of shank that fastens onto the machine.  
7 Next, please.

8 This is a similar picture of  
9 the other tooth about eight inches long. Next, please.

10 This is then the ditching  
11 machine set up to start winter operation at the Seebe  
12 shale pit.

13 Q What kind of teeth?

14 A These are the Swedish  
15 teeth. Next, please.

16 And this is excavating the  
17 frozen shale at Seebe. We had tried this pit last fall  
18 and it looked like it would be a good test area, but  
19 we found that when the shale froze that the hardness  
20 just increased dramatically, so we weren't able to  
21 get good production rates in this very difficult  
22 frozen shale situation, but we did learn that these  
23 new teeth that we had stood up very well to the  
24 difficult materials, and we did learn that much.  
25 Next, please.

26 This shows the ditch wall  
27 in this shale pit at Seebe. You notice the striations  
28 here made by the teeth. The hardness of the material  
29 is very similar to concrete. Next, please.

30 This shows the teeth tried



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1 in the shale pit, they did wear not too badly but  
2 they didn't break, and they were subjected to pretty  
3 severe stresses. Next, please.

4 This is just another shot of  
5 the machineworking in the shale pit at Seebe. It's  
6 close to a mountainous area. Next, please.

7 This shows the comparative  
8 wear of some of the teeth in that Seebe test. This  
9 is a new tooth not worn. You can see maybe a quarter  
10 of an inch of wear here, a half inch of wear here.  
11 Next, please.

12 This is the other style  
13 similarly showing the amount of wear that they received  
14 at Seebe. Next, please.

15 So this is at the gravel  
16 pit in Calgary. We had about six feet of seasonal  
17 frost in the pit here, and it was a pretty rugged  
18 test for the machine, and the teeth. Again these are  
19 the same teeth that we tested at Seebe. Next, please.

20 This is just a bit of the  
21 ditch that was excavated in that gravel pit. Next,  
22 please.

23 This shows a closeup of  
24 the ditch wall where the teeth sheared some of the  
25 gravel that was frozen in the matrix in the ditch  
26 wall. Next, please.

27 Another closeup of rock  
28 fracturing. Next, please.

29 More of the same thing.  
30 Next, please.









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1 fully automatic methods. Welds completed during the  
2 welding procedure tests will be tested as required by  
3 regulations, and in addition, hardness and toughness  
4 tests will be carried out. All welds will be subject  
5 to both visual and non-destructive testing utilizing  
6 radiographic and/or ultrasonic techniques, as required  
7 for adequate testing of the welding process utilized.

8 MR. GENEST: Mr. Commissioner,  
9 if I might interrupt the witness here. Mr. Holmberg  
10 last week indicated that a film was available illus-  
11 trating the automatic welding process. I understand  
12 that we have received it but have not yet seen it.  
13 We'll look at it tonight and if it's of interest, sir,  
14 we might show it, perhaps not interrupt the cross-  
15 examination if we're going to sit tomorrow afternoon,  
16 as I understand was the intention, we might put it  
17 on at that time, if that is convenient to you and the  
18 parties.

19 THE COMMISSIONER: Fine,  
20 certainly.

21 Q Can I just ask you, Mr.  
22 Williams, before we leave the ditching machine, you  
23 showed three examples of what you call the new  
24 generation ditching equipment, developed by Bannister  
25 and a firm in Calgary and Barber-Reid, I think. Then  
26 you said at the conclusion of your presentation that  
27 Arctic Gas was -- had asked you to go ahead and develop  
28 a type of ditching machine that wasn't -- that went  
29 beyond apparently those three examples of <sup>the</sup> new genera-  
30 tion of ditchers.



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1 WITNESS WILLIAMS: Yes sir.

2 Q Is that where we're at?

3 That's what --

4 A Yes, in the conclusion  
5 I think I also said that these ditching machines that  
6 are available will excavate a good percentage of this  
7 pipeline project. We want to develop a larger one to  
8 get a little bit more than these present ones might  
9 not make. There are so many advantages to excavating  
10 with a wheel type ditcher over blasting and excavating  
11 blasted material, that we certainly are encouraging it  
12 and feel it's worthwhile.

13 Q And the realistic  
14 assessment as to the first winter when excavation  
15 would be undertaken is 1978-79 ?

16 A That's right, yes sir.

17 Q So you're testing -- you  
18 may be able to test the ditcher that Arctic Gas has  
19 asked you to invent or whatever it is, develop, I'm  
20 sorry, develop, this winter -- meaning next winter --  
21 which would be the winter of '76 - '77, that would  
22 give you two years?

23 A We're hoping for the winter  
24 of '75-'76, sir, which would be early '76.



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THE COMMISSIONER:

Q Right.

A We are not sure we can make that, but we were hoping for it.

Q That would give you how many winters? That would give you three winters, would it, to test it, or to develop the kind of machine you want?

MR. GENEST:  
That's right.

A  
If we are able to test it early in '76, that would give us two years to iron out the bugs.

MR. GENEST:

Q Can I go to coating and wrapping, Mr. Dau?

WITNESS DAU:

A Yes, sir. Two options are available for coating and wrapping, either continuous line travel tape coating, or the use of pre-coated pipe. Selection of the method to be used in specific location is a matter of final design.

Q Well, do you have a choice between coating and wrapping, is that -- they are not mutually exclusive, are they?

A Coating and wrapping is essentially one operation. There are two options available to us, one which is the continuous line travel tape coating that Mr. Williams showed in one of his slides, and the other one is a pre-coated pipe, where the pipe is pre-coated at the pipe mill



1 or at some other location, and is transported to the  
2 right-of-way in a coated condition, and then the only  
3 coating which has to be done in the field is around  
4 the weld itself.

5 Q Then following the coating,  
6 you have a number of steps to do. Would you describe  
7 them?

8 A Yes, the next step is  
9 lowering the pipe into the ditch. Prior to lowering  
10 in, the ditch will have been cleaned of debris and  
11 drifted snow. When the ditch bottom cannot be com-  
12 pletely cleaned to provide a smooth surface, a six  
13 inch layer of bedding material will be provided in  
14 the ditch bottom. The pipe, when laid in the ditch,  
15 will conform<sup>to</sup> the bottom contour of the ditch, so  
16 that it will be uniformly supported.

17 Next, tie-ins by girth welding,  
18 will be required to connect the welded pipe sections.

19 Q I don't get that sentence,  
20 on re-reading it, Mr. Dau. Could you explain it?

21 A Yes. We have welded up  
22 some pipe sections that will vary from a few hundred  
23 feet to several thousand feet in length, and --

24 THE COMMISSIONER: You mean  
25 you will have done some girth welds before -- you  
26 will do the girth welding before you lay the pipe?

27 A Yes. The girth welding  
28 is the welding that's required to join two pieces of  
29 pipe together, two sections of pipe together.

30 Q Right.





1 A And the welding operation,  
2 as you saw in some of the slides, is done above  
3 ground, in sections that vary in length. And the  
4 tie-ins is really tying those sections together.

5 MR. GENEST:

6 Q I see. And that's once they are  
7 lowered into the ditch?

8 A Yes, sir.

9 Q And how do you do that?

10 A By a girth weld. It's just  
11 a matter of -- instead of welding two 40 foot pieces  
12 of pipe together, we are welding long sections together  
13 is all. No, the weld is not done in the ditch.

14 Q You raise it and then you  
15 lower it?

16 A Yes.

17 Q Well that's what was --

18 A Okay.

19 Q -- I couldn't figure out  
20 how you got under the bottom.

21 A I'm sorry.

22 Well the length of these sect-  
23 ions will depend on the number of bends in the  
24 section, whether they are road, rail, pipeline and  
25 river crossings, and whether there are any valve  
26 installations.

27 The tie-ins will be made  
28 using conventional practices of cutting, aligning and  
29 welding of pipe ends.

30 Q Then we are dealing with



1 buoyancy control measures?

2 A The pipe will be subjected  
3 to buoyant forces whenever it becomes partially or  
4 fully submerged in a water or soil water slurry  
5 medium. Several methods of buoyancy control will  
6 be utilized.

7 Continuous concrete coating will  
8 be used at selected locations, such as major river  
9 crossings and certain minor river crossings. Bolt-on  
10 river weights will be used on smaller water course  
11 crossings, and saddle weights will be used in other  
12 wet areas, such as muskeg where weighting is required.

13 Pipe anchors may be used in  
14 areas where underlying soil or rock will maintain  
15 anchorage.

16 Q Now we are going to go on  
17 to the question of backfilling, are we?

18 A Yes, sir.

19 In carrying out the backfilling  
20 operation, where rock, gravel, frozen fill or material  
21 is encountered of a size or shape that could cause  
22 damage to the pipe, one of the following procedures  
23 will be used: The pipe will be protected by the  
24 placement of select padding material, that consists  
25 of processed spoil material or borrow around the pipe  
26 to a minimum thickness of six inches, or rockshield  
27 will be applied.

28 After lowering in and backfill-  
29 ing the ditch, all remaining ditch<sup>spoil</sup> will be placed  
30 in a crown over the ditch centre line, so as to



1 compensate for spoil settlement.

2 If the native backfill is found  
3 to be unsuitable, select borrow will be placed, and  
4 the native backfill will be disposed of at appropriate  
5 locations. Select borrow may be required for, first  
6 backfill purposes at bends, and at road crossings;  
7 secondly, drainage, erosion and buoyancy control;  
8 third, areas of potential frost heaving and settlement;  
9 fourth, areas of potential seismic activity and  
10 lastly, grade restration.

11 In areas where the surface of  
12 the tundra has been removed and stockpiled before  
13 pipeline construction, it will be replaced on the sur-  
14 face of the backfilled area.

15 Q Now we are at the question  
16 of major river crossings?

17 A Major river crossings will  
18 normally be installed by welding the crossing pipe  
19 into sections on prepared working areas on one bank  
20 of the river. The pipe sections will then be pulled  
21 along the bottom into place in the excavated pipeline  
22 trench. This procedure will be utilized unless excess-  
23 ive bank grading would be required to prevent buckling  
24 of the pipe during installation, or deep excavations  
25 of banks, particularly in permafrost areas, would  
26 create slopes, instability and erosion.

27 Q Just let me stop you there  
28 for a moment, Mr. Dau. Ignoring these excessive bank  
29 gradings and so on and special problem areas, I'm not  
30 too clear as to what you mean when you say the pipe





1 sections will be pulled along the bottom. How do  
2 you do that?

3 A Well, as an example in a  
4 river that let's say is 3,000 feet wide and there's  
5 an area on one bank of the river that's suitable for  
6 assembling the pipe into sections by welding joints  
7 of pipe together, that was let's say a thousand feet  
8 in length, you could then weld your pipe sections up  
9 into -- your pipe into three sections a thousand feet  
10 long.

11 You would pull from the opposite  
12 bank with a winch, you would have excavated your  
13 trench, of course. You would pull out a thousand  
14 feet of pipe, move the other one over, weld it on,  
15 pull another thousand feet, move the last section over  
16 and weld it on.

17 Q That's on the ice, you're  
18 pulling it on --

19 A No, sir.

20 Q You're doing that in the  
21 summer, aren't you?

22 A Yes, sir.

23 Q Right. You pull it along  
24 the bottom?

25 A Yes, sir.

26 Q And you weld it below,  
27 under water?

28 A No, you weld it up on  
29 your working area, where you welded up your pipe  
30 sections, the three sections of pipe that you welded



O'Rourke, Dau, Williams  
In Chief

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1 up.

2 Q Right.

3 A You take the first section,  
4 and you pull it into the river, you pull it along the  
5 bottom of the trench, but you leave a bit sticking out  
6 of the water, so you can weld the next one up.

7 Q All right. So you've got  
8 a section of pipe that's heading down to the bottom;  
9 one end is sticking out of the river and you weld on  
10 the next section?

11 A Yes, sir.

12 Q And you keeping pulling  
13 it --

14 A Yes, sir.

15 Q -- until you get the whole  
16 section?

17 A Yes, sir.

18 Q Thank you.

19 A If either of these two  
20 conditions exist --

21 Q Now the two conditions --  
22 I interrupted you, so the transcript will make sense.  
23 The two conditions you're discussing now are excessive  
24 bank grading which would be required to prevent  
25 buckling, or deep excavation of the banks, particularly  
26 in permafrost areas?

27 A Yes, that's correct.

28 Q Right.

29 A If either of these two  
30 conditions exist and shallows are located on one side



1 of the river, providing an area where a berm could  
2 be constructed, crossing pipe sections will be welded  
3 on a berm extending from the bank into the river  
4 channel, and then pulled into place off the berm by  
5 equipment located on the opposite bank.

6 A ditch will be excavated  
7 through the berm itself, and the final pipe section  
8 for the river crossing would be lowered into place  
9 directly from the berm.

10 Now, all that essentially says  
11 is we create a working area by building the working  
12 area out into the shallow water on one side of the  
13 river.

14 And the backfilling and restor-  
15 ation activities, the berm will be removed, and the  
16 granular material will be used as backfill material,  
17 and as erosion control cover where required.

18 Where excavation of the trench  
19 and the river channel for the pipeline crossing will  
20 require drilling and blasting, it will be conducted  
21 through the ice during the winter prior to installat-  
22 ion.

23 During the following summer  
24 and spring, prefabrication of the crossing sections  
25 will be completed with the welding of pipe joints  
26 into sections. The lengths of sections will normally  
27 be from 500 to 1,000 feet, depending on the available  
28 working area and width of the river crossing.

29 Each weld will be radio-  
30 graphically inspected and each pipe section



O'Rourke, Day, Williams  
In Chief

1 hydrostatically tested.

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Dau, O'Rourke, Williams  
In Chief

1 Pipe joints will be pre-  
2 coated with anti-corrosion coating and concrete at  
3 staging areas such as Hay River, and shipped to the  
4 river site. Alternatively, pipe may be welded and  
5 given a uniform coating of concrete at the field  
6 site. The concrete coating will be joined by means of  
7 compressible spaces to allow the coated pipe to assume  
8 the required curvature during installation. During the  
9 summer and fall the excavation of the trench in the  
10 river bed will be completed. Backhoes, clamshells,  
11 draglines, dredges, or combinations of these machines  
12 will be used to excavate the trench. Spoil will be  
13 cast aside beside the trench on the downstream side.  
14 Winches will be set in place on the bank of the river  
15 opposite the prefabrication area. On the prefabrica-  
16 tion side, rollers or tracks and dollies will be used  
17 to guide the pipe sections into the excavated ditch  
18 and across the river. The pipe sections will be  
19 guided and restrained during the pulling by hold-back  
20 winches, cranes and side booms positioned on the top  
21 of the bank and along the approach slope. Sufficient  
22 floatation cylinders will be banded to the pipe to  
23 keep the pipe just off the river trench bottom during  
24 the pull. Once the crossing is in place, the floatation  
25 cylinders will be removed, allowing the pipe to settle  
26 into the trench bottom.

27 As each successive pipe  
28 section is pulled, the next sections will be welded  
29 on and the joint welds will be radiographically tested  
30



Dau, O'Rourke, Williams  
In Chief

1 and coated until all sections have been welded together.  
2 Once in place the complete river crossing sections  
3 will be hydrostatically tested.

4 Q Could I just go back for  
5 a moment, Mr. Dau? You have on the previous page of  
6 your summary of evidence, 21, a statement that:

7 "Where excavation of the trench in a river  
8 channel for the pipeline crossing will require  
9 drilling and blasting, it will be conducted  
10 through the ice during the winter prior to  
11 installation."

12 I take it that the "it" there refers to the drilling  
13 and blasting.

14 A Yes, that's correct.

15 Q And do you expect the  
16 -- whatever excavation has been accomplished by that  
17 process to be filled in during the spring flood?

18 A There wouldn't be any  
19 excavation accomplished. It would be a matter that  
20 you've loosened it up so it could be excavated.

21 Q You loosen it up and you  
22 go back and do the excavation at the time of the  
23 installation of the crossing.

24 A That's right.

25 Q Well then, that takes  
26 us to minor river crossings, and perhaps it might be  
27 useful to recall that the distinction between major and  
28 minor is really in your province, in contractor's  
29 terms, is that -- do I understand that correctly?  
30 A minor crossing is one that the contractor -- or a



Dau, O'Rourke, Williams  
In Chief

1 major crossing is one that you let a separate contract  
2 for?

3 A Yes, you generally have  
4 a contractor who specializes in river crossings install  
5 the major crossing, where the minor crossings would  
6 be installed by the contractor who is installing the  
7 pipeline in the area. For most of the minor river  
8 crossings the water flow under winter conditions is  
9 either very low or nil. Therefore these crossings can  
10 be constructed through the ice by lowering the pipe  
11 directly into the ditch, with side boom tractors and  
12 cranes. The trench excavation will be carried out  
13 using a combination of drilling and blasting, clamming,  
14 hoeing and dredging and draglining, as determined by  
15 the nature of the river bed material.

16 Q And how will you handle  
17 road and highway crossings?

18 A Road and highway crossings  
19 will be carried out by open cut, where permitted.  
20 Temporary passage of traffic will be provided for by  
21 either a detour or a temporary bridge across the  
22 excavation. Pipe at crossings will either be protected  
23 by a casing pipe 56 inches in diameter surrounding the  
24 carrier pipe, or heavy wall pipe will be used. The  
25 crossing pipe will be backfilled with granular material  
26 and the fill will be compacted as specified to prevent  
27 settlement of the road surface.

28 Where necessary, board and  
29 case crossings will be installed under major roads,  
30 highways and railroads. These will be gored for a



Dau, O'Rourke, Williams  
In Chief

1 56-inch diameter casing pipe. The carrier pipe supported  
2 by insulated spacers will be placed inside the casing  
3 pipe, with casing seals at each end.

4 THE COMMISSIONER: Could we  
5 go back, Mr. Dau?

6 A Yes.

7 Q For a moment. Major  
8 river crossings and minor river crossings, so far as  
9 you're concerned, are the so-called major river  
10 crossings limited to the Mackenzie, the Bear, the Peel  
11 and so on, or in other words is it that half-dozen?

12 A That would be my view,  
13 yes sir.

14 Q I only mentioned three  
15 but there must be more. The two of them, the Mackenzie  
16 under the revised<sup>plan</sup> the Bear, the Peel and --

17 MR. GENEST: I think I remember  
18 others but offhand I can't -- is the Willow Lake a  
19 major crossing?

20 A I wouldn't think so.

21 Q No.

22 A Not in our classification,  
23 sir. There would be some major crossings south of 60°.

24 Q North of 60, do you think  
25 you can safely peel off from memory the ones you con-  
26 sider major?

27 A The Mackenzie at Point  
28 Separation, at Swimming Point.

29 Q I think, sir, at page  
30 48 of tab 6, in the construction volume, Exhibit 55,







Dau, O'Rourke, Williams  
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1 A Yes, there's three Mac-  
2 kenzie River crossings, the Peel River, and the  
3 Great Bear.

4 Q That's right, and there  
5 is one less Mackenzie Crossing and there's the Liard  
6 River that does not need to be crossed in view of the  
7 Fort Simpson --

8 A Just Liard is dropped.

9 Q -- change. Are there  
10 still three Mackenzie crossings?

11 A Yes sir.

12 Q Right.

13 THE COMMISSIONER: Well, north  
14 of 60, how many crossings are there of the Mackenzie?

15 A There's a Mackenzie  
16 River crossing at Swimming Point.

17 MR. GENEST: Point Separation?

18 A South of Richards  
19 Island; there's a Mackenzie River crossing at Point  
20 Separation for the lateral from Prudhoe Bay; there's  
21 the Peel River crossing; there's the Great Bear River  
22 crossing; and there's the Mackenzie River crossing  
23 near Fort Simpson.

24 Q And there used to be  
25 the Liard. Let's move on now, sir, to the construc-  
26 tion of compressor/measurement stations.

27 A The construction schedule  
28 for compressor and measuring stations allows for  
29 construction in both winter and summer seasons. Summer  
30 construction, particular concrete foundation work,



Dau, O'Rourke, Williams  
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1 will be used wherever possible. In the north, access  
2 limitations will dictate that most of the station  
3 pads be constructed in winter. Wherever possible, the  
4 gravel pads at compressor stations will be used  
5 initially as stockpile and campsites for the construc-  
6 tion of the pipeline, and support of operations and  
7 maintenance activities until the station is construc-  
8 ted. Metal clad insulated buildings will house the  
9 major components. These buildings will be supplied in  
10 prefabricated form, thus simplifying erection and  
11 assembly at the station site. Mechanical and electric  
12 equipment required for stations will be supplied in  
13 modules constructed and assembled and tested in  
14 southern centres. The main gas and gas refrigeration  
15 piping will be prefabricated to the extent practicable.

16 Q The next step we deal  
17 with then is the cleanup operation.

18 A Yes sir.  
19  
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1 All surplus construction  
2 material would be collected and returned to the  
3 original construction stockpile points, or to other  
4 designated storage areas. All waste construction  
5 material will be removed and disposed of at designated  
6 locations. Combustible waste will be burned.

7 Other materials will be buried  
8 on the right-of-way at stations or other facility  
9 sites, or at abandoned borrow pits. All buried mater-  
10 ial will be covered with at least 24 inches of fill.  
11 All damaged or leaning trees will be felled unless  
12 otherwise specified by the land owner or regulatory  
13 authority.

14 Public and private roads used  
15 or crossed during construction will be returned to a con-  
16 dition at least equal to their standard prior to  
17 construction. Temporary roads built for construction  
18 purposes will be cleaned up in accordance with the  
19 requirements of the land owner or regulatory  
20 authority.

21 Q That sentence, Mr. Dau,  
22 what land owner do you have in mind?

23 A That applies almost ex-  
24 clusively to south of 60, private land owners.

25 Q Then we could deal, could  
26 we, with restoration and revegetation?

27 A The pipeline right-of-way  
28 will be ~~restored~~ to its original condition as com-  
29 pletely as is practicable. Cuts for construction  
30 purposes will be graded to conform -- to form safe



1 and stable slopes. This will require placement of  
2 breakers, cross berms, terraces and diversion ditches  
3 across the right -of-way to prevent the flow of water  
4 along the pipeline ditch and to maintain, to the extent  
5 possible, natural drainage passages -- patterns.

6 Q These were discussed by Dr.  
7 Clark's panel in some detail?

8 A I believe so, sir.

9 Q This is what we are talking  
10 about here, isn't it?

11 A Yes.

12 Q And the first spring  
13 following construction, the right-of-way will be  
14 seeded and fertilized. Aircraft will be used to seed  
15 the straight and relatively level portions of the pipe-  
16 line. Other areas will require use of helicopters.  
17 Ground crews will be used at hillsides, river cross-  
18 ings or other areas requiring the spreading of erosion  
19 control mats, the planting of shrub cuttings or the  
20 application of seed by hand.

21 At borrow pits which will not  
22 be required for operating and maintenance purposes,  
23 restoration will be undertaken as soon as practical,  
24 following completion of construction.

25 Restoration and revegetation  
26 will also be required around the boundaries of station  
27 pads, air strips and roads. This entire subject will  
28 be described in greater detail during phase 2.

29 Q Sir, we are at the subject  
30 of field pressure testing, which I think is a mere





1 repetition of what we heard in the design panel.

2 And I see it's six o'clock.

3 It occurs to me, sir, that if  
4 we are going to start cross-examination tomorrow and  
5 we are going to show a presentation relating to auto-  
6 matic welding after some people have started cross-  
7 examination, we may be getting ourselves into a bind  
8 as to showing material in chief that people who have  
9 already cross-examined, may want to ask questions on.

10 So I wonder what the best pro-  
11 cedure is. I'm in everyone's hands.

12 THE COMMISSIONER: Well, I  
13 would be inclined myself, Mr. Genest, to take the  
14 view that we ought to proceed with cross-examination  
15 tomorrow morning. The film I think should be deferred,  
16 because it seems to me unlikely that there will be a  
17 great many questions about automatic welding, and  
18 that would be my feeling.

19 Mr. Hollingsworth and Mr. Bell,  
20 Mr. Bayly, Mr. Veale and Mr. Goudge, we will certainly  
21 reach some of you tomorrow and for all I know, reach  
22 everyone of you -- you can work out among yourselves  
23 presumably the order in which you will proceed, in  
24 case you want to alter the usual arrangement.

25 Counsel for Canadian Arctic  
26 Resources Committee isn't here, and I'll put them  
27 after Commission counsel, and expect all of you to  
28 go before we call upon Mr. Anthony or Mr. Lucas, and  
29 if they didn't think we had reached cross-examination  
30 and they had not planned to be here, we will try to



1 sort that our before Wednesday afternoon.

2 MR. HOLLINGSWORTH: Mr.  
3 Commissioner, I presume if some of us proceed with  
4 cross-examination before this film is shown, and  
5 questions would arise, you will permit us to open  
6 cross-examination again on the points raised in the  
7 welding film?

8 THE COMMISSIONER: Yes, certain-  
9 ly.

10 MR. GOUDGE: Well it may be, sir,  
11 that over the evening or after we break now, if counsel  
12 are interested in pursuing the matter of automatic  
13 welding, they could let Mr. Genest/<sup>and myself</sup>know and we perhaps  
14 could come tomorrow armed with some knowledge of  
15 people's interest in that.

16 THE COMMISSIONER: Well, if  
17 counsel decide among themselves that they want to see  
18 this film first thing in the morning, that's all  
19 right with me. I'll leave it entirely up to all of  
20 you, and if you want to decide that first thing in  
21 the morning, that's all right too.

22 I just thought that we'd all be  
23 fresh in the morning, and counsel would be perhaps  
24 rather more anxious to cross-examine then, than 3,  
25 or 4 or 5 in the afternoon. Films are things that we  
26 all just have to sit here and take it in, but --

27 MR. GOUDGE: Sir, I take/<sup>it</sup>it's  
28 your intention to sit both tomorrow morning and to-  
29 morrow afternoon?

30 THE COMMISSIONER: Yes, unless



1 it turns out that we're not any farther ahead if we  
2 do that, but I think we will start at nine in the  
3 morning and carry on til one, and then go from 2:30  
4 for another hour or two hours, whatever -- we'll see  
5 how far we get before we run out of gas.

6  
7 (PROCEEDINGS ADJOURNED TO 9:00 A.M., TUESDAY,  
8 APRIL 22ND, 1975)  
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347  
M835  
Vol. XXXIII

AUTHOR

Mackenzie Valley pipeline inquiry:

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# MACKENZIE VALLEY PIPELINE INQUIRY

IN THE MATTER OF AN APPLICATION BY CANADIAN ARCTIC  
GAS PIPELINE LIMITED FOR A RIGHT-OF-WAY THAT MIGHT  
BE GRANTED ACROSS CROWN LANDS WITHIN THE YUKON  
TERRITORY AND THE NORTHWEST TERRITORIES FOR THE  
PURPOSE OF THE PROPOSED MACKENZIE VALLEY PIPELINE

and

IN THE MATTER OF THE SOCIAL, ENVIRONMENTAL AND  
ECONOMIC IMPACT REGIONALLY OF THE CONSTRUCTION,  
OPERATION AND SUBSEQUENT ABANDONMENT OF THE ABOVE  
PROPOSED PIPELINE.

(Before the Honourable Mr. Justice Berger, Commissioner)

Yellowknife, N.W.T.

April 22, 1975.

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PROCEEDINGS IN INQUIRY

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VOLUME XXXIV

CANADIAN ARCTIC  
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APR 30 1975

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APPEARANCES:

Mr. Ian G. Scott, Q.C.	
Mr. Stephen T. Goudge,	
Mr. Alick Ryder and	
Mr. Ian Roland	for Mackenzie Valley Pipeline Inquiry;
Mr. Pierre Genest, Q.C.	
Mr. Jack Marshall,	
Mr. Darryl Carter, and	
Mr. John Steeves	for Canadian Arctic Gas Pipeline Limited;
Mr. Reginald Gibbs, Q.C.	
Mr. Alan Hollingworth	for Foothills Pipelines Ltd.;
Mr. Russell Anthony,	
Prof. Alastair Lucas	for Canadian Arctic Resources Committee;
Mr. Glen W. Bell and	
Mr. Gerry Sutton	for Northwest Territories Indian Brotherhood and Metis Association of the Northwest Territories;
Mr. John U. Bayly	for Inuit Tapirisat of Canada and the Committee for Original Peoples' Entitlement;
Mr. Ron Veale and	
Mr. Allen Lueck	for Yukon Native Brother- hood;
Mr. Carson H. Templeton	for Environment Protect- ion Board;
Mr. David Reesor	for Northwest Territories Association of Muni- cipalities
Mr. Murray Sigler	for Northwest Territories Chamber of Commerce

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John Richard O'ROURKE	
Guy Leslie WILLIAMS	
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Yellowknife, N.W.T.

April 22, 1975.

(PROCEEDINGS RESUMED PURSUANT TO ADJOURNMENT)

MR. GOUDGE: Mr. Commissioner,  
I think we're prepared to reconvene. Mr. Genest has  
some film entertainment for us, I think.

Before we do that,  
MR. GENEST: Mr. Commissioner,  
we have been keeping track of some of the undertakings  
that are given from time to time, and we are in a  
position this morning to fulfill three of them, and  
perhaps Mr. Marshall could do this.

MR. MARSHALL: Thank you.  
Mr. Commissioner on March 11th Arctic Gas was asked  
to prepare with the producers a map which would show  
the delta producers' facilities and the proposed pipe-  
line facilities. Such a map has been prepared by  
Northern Engineering. It's entitled:

"Delta Producers Facilities in relation to  
Canadian Arctic Gas Pipeline Routes stated  
April 9, 1975."

I've given a copy to Miss Hutchinson and we propose  
to file that as an exhibit.

THE COMMISSIONER: Thank you.

(DELTA PRODUCERS FACILITIES MAP MARKED EXHIBIT 117)

MR. MARSHALL: On March 12th,  
I believe it was Mr. Anthony was asking at approxi-  
mately 1832 for information as to additional pipeline  
topography that had been terrain typed by Dr. Mollard.  
Mr. Williams has had a map prepared which is entitled:  
"Master Index Map, Gas Pipeline Route Alignment





1 and Terrain Data Sheets with additional  
2 terrain type photography flight lines, dated  
3 April 14, 1975."

4 We just have the one copy of it but it's available for  
5 inspection by any of the participants.

6 THE COMMISSIONER: Yes.

7 MR. MARSHALL: On April 8th  
8 at pages 2962 to 64, Mr. Anthony was asking for  
9 information as to the location of the Mackenzie  
10 Highway, as it existed early in 1973. Mr. Williams  
11 has obtained from the Department of Public Works  
12 mosaic sheets pertaining to Milepost 297 to 729 of  
13 the Mackenzie Highway relative to the pipeline  
14 location. These are photographic sheets and we  
15 just have one copy of the report, but again it's  
16 available for inspection by any of the participants.

17 Thank you, sir.

18 THE COMMISSIONER: Thank you,  
19 Mr. Marshall.

20 MR. GENEST: Mr. Commissioner,  
21 we have also now had an opportunity of looking at the  
22 film referred to by Mr. Holmberg in his testimony last  
23 week with reference to automatic welding. It is a  
24 short film, lasting about 15 minutes. I have spoken  
25 to my friend, Mr. Goudge, who indicated, subject  
26 to your approval, sir, a preference that it should  
27 perhaps go on this morning because it is short.

28 In addition to that, sir, we  
29 have some slides illustrating a method of river cross-  
30 ing or the method of major river crossing that was



1 discussed by the panel yesterday. I understand there's  
2 some interest in that. That is also a fairly brief  
3 presentation, taking about 20 minutes, and my friend  
4 Mr. Goudge indicated again that, subject to your  
5 approval, perhaps we should put that on this morning.  
6 That will be the end of our evidence except for a  
7 short statement in connection with field testing.  
8 Is that satisfactory, sir?

9 THE COMMISSIONER: Yes, yes.

10 MR. GENEST: Oh, on the film  
11 I should add, sir, that the film itself is a bit of  
12 a sales pitch by the manufacturers. I should stipulate  
13 that we do not stand behind the statements made by  
14 that, we're not in a position to defend them. We are  
15 putting it on strictly for the purpose of illustrating  
16 the process, so that I don't want anybody to feel that  
17 he is under an obligation to try and contradict the  
18 statements made by the voice in the film, which is not  
19 ours and which we do not either support or repudiate.

20 The film was made in 1972,  
21 I understand.

22  
23 ( FILM PRESENTATION, A FILM BY C.R.C.-CROSE CORPORATION  
24 INC. ON AUTOMATIC WELDING)  
25  
26  
27  
28  
29  
30



1 MR. GENEST: Well that concludes  
2 that film, and then perhaps I might ask Mr. Williams  
3 to give us his slides now, illustrating the method of  
4 accomplishing a major river crossing.

5  
6 JOHN RICHARD O'ROURKE,  
7 PHILIP HARVEY DAU,  
8 GUY LESLIE WILLIAMS, Resumed:

9  
10 DIRECT EXAMINATION BY MR. GENEST, CONTINUED:

11  
12 Q I understand, sir, that  
13 these are slides showing a river crossing of the Fraser  
14 River at or near Prince George, British Columbia.  
15 Do we have the year of that, Mr. Williams?

16 WITNESS WILLIAMS:

17 A Mr. Genest, I think it was  
18 two years ago, that would be '73.

19 Q And that was in connection  
20 with the twinning of their line, and I think we will  
21 see in the photographs here, there was an overhead  
22 crossing on the original line, and when they looped  
23 they elected to go underground.

24 Would you proceed, Mr. Williams?

25 A Yes, and I am sorry that  
26 I don't have any film showing the excavation of the  
27 river crossing. I wasn't on this job, of course. It  
28 was for Westcoast, constructed by Marine Pipeline.  
29 They have told me, though that the main section of  
30 the river was excavated with a dredge, and the



1       embankments would be excavated mainly with drag lines  
2       and back-hoes.

3                       And this first slide shows the  
4       beginning of the pull. The end of the pipe has a cap  
5       welded on it, cap welded on the end with an eye to  
6       take the cable that is assisting in the pull across  
7       the river. YOU will see the rest of the equipment  
8       in a minute.

9                       This dark section here I think  
10      probably has rockshield on it, banded on with steel  
11      bands, and the bend here will form the overbend on the  
12      opposite side of the river. Can we have the next one,  
13      please?

14                      This is just a little bit back  
15      from the previous slide, the overbend is here and the  
16      sag bend on the opposite side of the river is here.  
17      This section of pipe that is lagged with two by fours,  
18      banded on with steel banding, will be on the bank on  
19      the opposite side of the river, and this section shows  
20      the concrete coated pipe that will be in the water.  
21      You see the first section here has been welded up, and  
22      the pull has started. That's effected  
23      with the cable on the front of the section with assist-  
24      ance from the side booms here, lifting the section  
25      into the trench. Next, please.

26                      And this is just a little bit  
27      further into the river. This is the sag bend on the  
28      opposite bank, and the overbend. Because this section  
29      of pipe isn't weighted, and of course because of the  
30      bends, this part of the pipe will float, whereas the





1 part that is concrete coated will be in the excavated  
2 trench. Next, please.

3 Probably here the first section  
4 is in the water, and the second section has been  
5 welded on. These are the flotation cylinders that Mr.  
6 Dau referred to yesterday that are used to keep the  
7 pipeline just off the bottom of the trench during the  
8 pipeline installation. Next, please.

9 This picture in the other direct-  
10 ion is here showing four side booms assisting in this  
11 -- in the movement of the pipe into the river. Next,  
12 please.

13 We put this one in to show that  
14 there's a cable laid along on top of the concrete here,  
15 but inside the wire bands, and after the pipe is  
16 in place, this cable will be long enough to double  
17 back and they will pull to sever the bands here, allow-  
18 ing the flotation tanks to float to the surface and  
19 they will be picked up by boat, and the wire bands  
20 are fixed to the flotation cylinders and they will be  
21 retrieved at the same time as the drum. Next,  
22 please.

23 . Probably this is the end of the  
24 second section, it is into place, and the side booms  
25 here are moving the third section into the ditch. It  
26 -- this section of course will be welded on here and  
27 the pull will be continued. Next, please.

28 I don't know if I mentioned,  
29 but on this particular pipe it's 36 inch diameter,  
30 a little less than one-half inch wall and they have



1 six inches of reinforced concrete on the outside,  
2 poured in place concrete using forms. The other method  
3 that could have been used, of course, is gunite or  
4 sprayed on type of concrete. Here, the joint has been  
5 welded and the workmen are installing the rockshield,  
6 and then the lagging, the wooden lagging, the two by  
7 four lagging would be put on top of that to protect  
8 the pipe after installation.

9 Q What's the rockshield made  
10 of, Mr. Williams?

11 A It's an asphalt impregnated  
12 paper, oh a quarter to three-eighths of an inch  
13 thick, fairly flexible, Mr. Genest. Next, please.  
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Dau, O'Rourke, Williams  
In Chief

1                                This is the last section of  
2 pipe being welded on.    This bend in the pipe here  
3 will form the sag bend on the near side of the river,  
4 or the side where the pipe was welded up into sections.  
5 Next, please.

6                                Here the pull is nearing  
7 completion. This is the equipment that was used in  
8 the tow that pulled on the end . It gives you a little  
9 better shot of that in the next one, I think, but you  
10 can see here that the excavation is well into the  
11 flood plain of this bank. Next, please.

12                               Here the pull is completed.  
13 The double line used to the tractors fixed on the bank,  
14 you get a little better idea of the eye and the end,  
15 the well cap on the end of the pipe. Next, please.

16                               This is back now on the other  
17 side of the river. The crossing is completed, and  
18 they are starting to weld pipe back towards the  
19 camera now, of the completed section.

20                               Q     What we see there is  
21 the overbend on this shore.

22                               A     That's the overbend on  
23 this shore, that's correct, yes, and it looks like this  
24 is late September, I think, and the snow was starting  
25 to fall. I'm sorry again that I don't have any pictures  
26 of the pipeline after the backfilling and cleanup was  
27 completed, but a dredge was used to backfill the  
28 main channel, and of course the material on the banks  
29 here that was excavated from the flood plain would  
30 be replaced with dozer type equipment.





Dau, O'Rourke, Williams  
In Chief

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Thank you.

MR. GENEST: Mr. Commissioner,  
my last questions to this panel concern field pressure  
testing. It is in the main, or it repeats in the main  
a good deal of what we heard last week, but this panel  
is also competent to deal with the matter and I thought  
that we might just put it in.

Q Did you discuss field  
pressure testing, Mr. Dau?

WITNESS DAU: In addition to  
the hydrostatic testing of the pipeline, which we  
will go on to describe, it is proposed to run an  
internal electronic inspection tool through the pipe-  
line to detect any injurious defects not previously  
detected, particularly those that may have occurred  
during construction. In the hydrostatic testing  
operation, the pipeline will be pressure tested after  
construction, using a liquid test medium. Certain  
specific pressure tests within stations or plant  
piping may be done with a gaseous medium. In non-  
permafrost regions, water will be used as the test  
medium. Winter testing in non-permafrost regions  
will be done using warm water test methods. The  
pipeline in permafrost regions will be tested during  
the winter construction season, and the test medium  
will be either water or water freeze depressant  
solution. The freeze depressant currently being  
considered is methanol.  
If water is spilled during testing



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1 it will be allowed to disperse by natural drainage.  
2 Should a spill cause localized flooding, suction  
3 pumps will be used to remove the water. In the event  
4 of an accidental spill with test medium containing a  
5 freeze depressant such as methanol, it will be allowed  
6 to pond; the suction pumps will then be used to recover  
7 as much of the spill as practical, and it will be  
8 stored in bladder-type storage tanks for re-use.

9                   Liquid test medium will be  
10 removed from test sections by the use of pigs or  
11 spheres propelled by compressed air or natural gas.  
12 Final drying of the test section will be done by  
13 rinsing the line with a quantity of methanol, carried  
14 through the test section between two pigs or spheres.  
15 The methanol recovered at the end of these dry  
16 runs will be re-used or disposed of in the same manner  
17 as the water-methanol test solution.



O'Rourke, Dau, Williams  
In Chief  
Cr. Exam. by Veale

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Q Thank you. Finally, Mr.

Dau, I understand that your panel has relied in the preparation of Section 13.b and in the giving of your evidence upon the list of studies and reports that were filed yesterday as an exhibit?

A Yes sir, listed in Appendix B.

Q That's Exhibit 109. That concludes my examination -in-chief of this panel, Mr. Commissioner.

MR. VEALE: Mr. Commissioner, I would like to thank fellow counsel for allowing me to appear out of order at this time to accommodate my trip back to the Yukon.

CROSS-EXAMINATION BY MR. VEALE:

Q I would like to begin by asking a question of Mr. Dau. How long has it taken you to actually formulate and put the construction plan on paper, as in the application before us?

WITNESS DAU:

A Well several years, sir. The first involvement that we had with this pipeline, proposed pipeline system, we obviously had to develop some sort of a construction plan for that. It has evolved over many years.

Q So when you say several years, you mean three years, is that the approximate



1 time frame?

2 A I think we first started  
3 the construction planning for it in '69 or 1970.  
4 1969 or 1970.

5 Q I see, and you would have  
6 sort of completed your planning early in 1974, just  
7 prior to the filing of the application?

8 A Yes sir, it was finalized  
9 for the application.

10 Q I note on your evidence  
11 yesterday, you indicated that Northern Engineering  
12 was assigned the responsibility of developing a con-  
13 struction plan for Arctic Gas approval. I assume  
14 you have that approval. That would deal with four  
15 criterion: The first being to allow construction to  
16 be completed in a reasonable period of time; the  
17 second, so that the construction plan would be con-  
18 sistent with good pipeline construction practice;  
19 thirdly, you were to have regard for the interests  
20 of the people of the north; and fourthly, you were  
21 to maximize protection of the environment. Now is  
22 that correct?

23 A Yes, sir.

24 Q Just to outline what each  
25 one of these criterion are, the first one speaks of  
26 a reasonable completion time and one of the important  
27 criteria there, I assume, would be finances. In  
28 other words, the shorter the amount of time spent in  
29 the field with crews working, the better it is. Would  
30 that be fair to summarize that particular criterion?





O'Rourke, Dau, Williams  
Cr. Exam. by Veale

1                   A     Yes, a reasonable period  
2 of time relates to cost, certainly.

3                   Q     And the second one consist-  
4 ent with good pipeline construction practice. That  
5 would relate, I assume, to integrity of the pipe, in  
6 other words, installing the pipe so that you have a  
7 good safe pipeline after construction --

8                   A     That's correct.

9                   Q     -- is completed?

10                  Now, the third one you speak of  
11 having regard for the interests of the people of the  
12 north. Now, precisely what interests did you consider  
13 in constructing this plan?

14                  A     The procedure we used was  
15 to develop what we thought was a plan that was the  
16 most logical and efficient plan, which was then re-  
17 viewed with the environmentalists that were either on  
18 staff with Northern, or were retained as consultants  
19 by Northern, and also reviewed in meetings with the  
20 sociological consultants retained by Canadian Arctic  
21 Gas.

22                   Those consultants were not  
23 retained by Northern. The plan that is filed was  
24 reviewed in the     April, 1973 meeting that we  
25 referred to previously in     previous panels.

26                  Q     Did you review it at any  
27 other times? It was April, and I gather there was  
28 another meeting in May. Was that the sum total of  
29 meetings that you had with respect to your consultants  
30 on the interests of northern people and the



1 environment?

2 A Those were the two rather  
3 formal meetings. The plan as it was being developed  
4 was discussed with the consultants retained by North-  
5 ern, and I can only assume that CAGSL did the same  
6 with their consultants. You would have to speak to  
7 them about that.

8 Q CAGSL consultants, they  
9 were the ones relating to the interests of the people  
10 of the north, is that right?

11 A Yes, sir.

12 Q And you had your own  
13 environmental consultants?

14 A Yes, we had retained three  
15 consultants, essentially in the wild life area, and  
16 we had the botanists on staff with respect to vegetat-  
17 ion.

18 Q Now, would you elaborate  
19 on some of the interests that went into consideration?  
20 You talk about the interests of people of the north.  
21 I assume that you probably attended those meetings  
22 in April?

23 A I attended part of them,  
24 sir, I have some notes, just a moment. Minutes of  
25 the April meeting, April '73 meeting have been filed  
26 here --

27 Q Yes.

28 A -- and I would have to go  
29 through on a page by page basis. There are many  
30 comments within the minutes with respect to the socio-



1 economic matters.

2 Q But surely, Mr. Dau, there  
3 were some interests that would come up time and again,  
4 and you would probably have developed some overall  
5 method of dealing with particular interests?

6 A Yes, there's -- on page 11  
7 for instance of the April 10th meeting, there's a  
8 reference with a concern at Fort Simpson. The  
9 concern, as I understand it, was that we should do  
10 everything we could to integrate utilities and facili-  
11 ties of the pipeline with the utilities and facilities  
12 in Fort Simpson. They suggested building adjacent to  
13 the settlement and integrate as closely as possible  
14 with the settlement.

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Dau, O'Rourke, Williams  
Cross-Exam by Veale

1 Q Have you<sup>in fact</sup> incorporated  
2 that particular interest into your construction plan?

3 A Only with respect to  
4 the operating and maintenance facilities that will be  
5 required. The pipeline is at, this stage, <sup>was</sup> some distance  
6 from Fort Nelson. It is currently -- or Fort Simpson  
7 -- it's currently, I believe it's something like six  
8 to seven miles away from Fort Simpson in its new  
9 location across the Mackenzie River.

10 Q Now did you have  
11 that example of incorporating your operations and  
12 maintenance in with the local community, is that the  
13 type of interest that you would consider with respect  
14 to each community that potentially could be involved  
15 in pipeline construction?

16 A Yes, that type of information,  
17 yes.

18 Q And what other interests,  
19 when you talk about the interests of the people of the  
20 north, would you have considered?

21 A We considered -- I think  
22 I spoke to the traplines at the panel on route  
23 location where we came to the conclusion that there  
24 were so many of them that it was impossible to miss  
25 them, and we were not aware of any specific location  
26 where we should move the pipeline to some degree be-  
27 cause of a trapline or traditional hunting area or  
28 something like that. We consider that would be a  
29 matter of final design, if in fact we should move it,  
30 move the pipeline some small distance, a minor





Dau, O'Rourke, Williams  
Cross-Exam by Veale

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2 relocation. Other things that come to mind would be  
3 location of wharves, docks, borrow sites and so on,  
4 so that anything that was left after the construction  
5 of the pipeline would be of use to the community. I  
6 believe there are some references in the Minutes to  
7 such circumstances. Do you wish me to try and find  
8 a particular reference Sir?

9 Q Well, if it's ready at  
10 hand, Mr. Dau, I'd appreciate it.

11 A I haven't got them  
12 marked.

13 Q ... you recall that  
14 being considered, though?

15 A Yes.

16 Q Now, just getting back  
17 to -- you spoke of hunting and trapping, what precise  
18 consideration did you give to hunting and trapping  
19 before presenting this construction plan before us now?

20 A Practically none, sir.  
21 As I said, the reference within these Minutes to  
22 hunting and trapping areas that the consultants to  
23 CAGSL were concerned about, but they covered such  
24 wide areas that there is no practical way that you could  
25 miss them. In fact, if you attempted to miss them,  
26 all you do is move into another one.

27 Q Did you get into such  
28 details as high trapping and hunting intensity areas,  
29 and low trapping and hunting intensity areas?

30 A I believe there was some



Dau, O'Rourke, Williams  
Cross-Exam by Veale

1 reference to areas that were more important than others,  
2 but my understanding of what was said, they were so  
3 extensive|that they couldn't be missed.

4 Q Now, continue, Mr. Dau.  
5 What other interests would you have taken into consider-  
6 ation? You've mentioned location of facilities, you  
7 mentioned hunting and trapping. What other interests  
8 of northern people were brought to your attention?

9 A There was one reference  
10 to setting up a construction training program at Fort  
11 Good Hope and of course it would have to be taken up  
12 by a policy witness from CAGSL. It didn't influence  
13 the construction plan or the location of the pipeline  
14 in any way. I can't recall any other specific things,  
15 sir. Perhaps in the archeological area where we  
16 were not aware of any important sites, and we've always  
17 recognized that if they become obvious to us it results  
18 in a minor re-location.

19 Q You say you're not aware  
20 of any important sites?

21 A We're not aware of any  
22 real important sites directly on the right-of-way, is  
23 what I'm saying. We're aware that we, during the final  
24 design and location, that in all probability some will  
25 be discovered and that at that stage it probably will  
26 result in a minor re-location of the pipeline.

27 Q I see. Would it be  
28 fair to say that in your meetings in April with your  
29 consultants that in some way or other you would have  
30 dealt with every community on the pipeline route?



Dau, O'Rourke, Williams  
Cross-Exam by Veale

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A Every community adjacent  
to the pipeline route, yes sir.

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Q And would that be  
whether it be the coastal route to the Yukon or  
interior routes in the Yukon?

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A That is correct.

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Q Now, it strikes me that  
the chronology of listing these four criterion is  
deliberate. In other words, you set up No. 1 and 2  
as being timing, integrity of the pipe and so on,  
good construction practice; three and four have been  
the interests of the people and maximizing protection  
of the environment. In other words I'm suggesting  
that there is a priority, and the priorities are in  
the order that they appeared in your evidence. Is  
that correct?

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A I would agree with you,  
sir, because that is a logical way of first locating  
and developing a construction plan. To do it in  
reverse order is more difficult. In fact I don't quite  
know how you would do it in reverse order because  
you would -- the first charge we had was to determine  
whether the system in fact was feasible, from a technical  
and economic point of view. I'm not saying that  
all items did not receive consideration, it's just  
that in my view this is the logical order that things  
should be done.

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Q In other words would  
it be correct that when a conflict arose between, say,



Dau, O'Rourke, Williams  
Cross-Exam by Veale

1 between item No. 1, the timing of construction, and  
2 item No. 4, the -- what you call maximizing the  
3 protection of the environment, there would have to be  
4 a trade-off somewhere, and one or other would be  
5 sacrificed. Now it may differ in various cases, you  
6 may sacrifice on both to achieve a trade-off, or you  
7 might say the environmental consideration really  
8 couldn't be fully looked at because it would have  
9 thrown timing off too much in terms of the actual  
10 construction period you envisage. Is that correct?

11 A No, I would say that  
12 there are no cases where we would completely ignore  
13 the concerns -- the environmental concerns. I agree  
14 with you that there is a trade-off and a compromise  
15 to minimize effects. We have flexibility in construc-  
16 tion plans as to -- we have some flexibility in con-  
17 struction plans as to the exact period of time we  
18 may be working at one location in the winter season,  
19 and if for instance March was a real bad period of  
20 time from an environmental viewpoint, to be at some  
21 mile post, we have flexibility in that we could  
22 re-arrange a schedule so that we would not be there  
23 at that time.

24 Q Fair enough.

25 A We cannot solve every  
26 concern that way, but we have some flexibility in  
27 doing that and there are compromises and trade-offs.

28 Q Right, I would agree  
29 with that. I would further suggest that there could  
30 be a circumstance where an environmental consideration





Dau, O'Rourke, Williams  
Cross-Exam by Veale

1  
2 would involve either such a long length of time or  
3 such a great expenditure of money that you would  
4 clearly have to over-ride that consideration if you  
5 were every going to complete your pipeline.

6 A Agreed.

7 Q Now you stated that you  
8 didn't in fact encounter any such consideration during  
9 your formulation of this construction plan.

10 MR. GENEST: I didn't get that  
11 question, Mr. Veale.

12 MR. VEALE: I am asking --

13 MR. GENEST: Did you say that  
14 he did not? I just didn't hear it.

15 MR. VEALE: The question was  
16 that I believe that Mr. Dau indicated that he hadn't  
17 made -- run into any environmental considerations  
18 which he had to completely over-ride for financial  
19 reasons.

20 A That's correct.

21 Q And with respect to the  
22 wording:

23 "Maximized protection of the environment,"  
24 it strikes me that that may be setting a goal in for-  
25 mulating your construction plan a little high, because  
26 in fact it appears to me what you're doing is you're  
27 taking your construction criterion and minimizing  
28 environmental disruption. You're not in fact maximiz-  
29 ing environmental protection, is that fair enough?

30 A Yes, I would agree.



1 Q Well Mr. Dau, in your  
2 plan you spoke of winter construction and summer  
3 construction. Now, in the context of Northern Yukon  
4 and Inuvik area, you've stated that winter construction  
5 is approximately three and three-quarter months, and  
6 summer construction approximately five and one-half  
7 months, is that correct? That would be on page 3  
8 of your --

9 A Yes, that is the period of  
10 time that is available, in our view, on the average  
11 for pipeline installation.

12 Q I see. Now, just doing a  
13 simple addition, that comes out to nine and a quarter  
14 months. Now, I'm trying to determine what the timing  
15 of your construction scheduling is. What's happened  
16 to the two and three-quarter months, now how does  
17 that fit in?

18 A If I could dig up some  
19 notes -- just a moment, sir.

20 THE COMMISSIONER: While Mr. Dau  
21 is finding the notes, will you tell me where the two  
22 and three-quarters months came from?

23 MR. VEALE: Three and three-  
24 quarter, I'm sorry, Mr. Commissioner, if I said two  
25 and three-quarter, I was incorrect.

26 MR. GENEST: I think he said  
27 three months -- are you referring to page 3 of his  
28 --

29 MR. VEALE: That's correct.

30 MR. GENEST: Because as I read



1 that, it didn' t say that, it said winter construction  
2 seasons range about three months in central Alberta  
3 to four and a half months in Inuvik, and average about  
4 three and three-quarter months.

5 MR. VEALE: Maybe Mr. Dau can  
6 explain that in his answer.

7 MR. GENEST:

8 He has forgotten the quest-  
9 ion.

10 I'm sorry. Could  
11 you repeat the question?

12 MR. VEALE: The question is I'm  
13 trying to determine what construction timing is, and  
14 it appears to me that just adding up the actual  
15 dates average or otherwise, that they don't arrive at  
16 a 12 month figure, and I'm trying to determine pre-  
17 cisely what winter construction is and what summer  
18 construction is.

19 WITNESS DAU:

20 A Yes, the response to your  
21 question is that there's a period of break-up and  
22 freeze-up in both construction modes, in winter con-  
23 struction and also in summer construction, where  
24 construction just can't take place. In the summer,  
25 for summer construction it's during a break-up period  
26 in the thaw it's just literally too muddy to work.

27 There is a period of time that  
28 you cannot work, and generally in that period of time  
29 you're attempting to move spreads from one location  
30 to another in this particular construction plan.



1                                Now, we've -- the major pipeline  
2       installation time frames in the north, and I'm talking  
3       about the major operations of the pipeline, not the  
4       snow roads or the initial operations, range from  
5       December 1st to April 15th. As you move farther south  
6       into the 60th Parallel and northern Alberta, it's  
7       compressed and we have about mid-December to March  
8       20th, in one particular case.

9                                In major operations in the  
10       summer, June 1st through October 31st.

11                              Q       Now that relates to northern  
12       or southern construction?

13                              A       That last June to October  
14       is summer construction south of 60. I'm talking pipe-  
15       line construction, sir.

16                              Q       What would -- don't let me  
17       interrupt you. Are you --

18                              A       I am trying to look for  
19       another date. I thought I had -- some of the earlier  
20       operations, such as snow road preparation and so on,  
21       in the far north can start as early as October.  
22       It varies over the route. The earliest operations  
23       over the section in the 60th Parallel starts sometime  
24       in October in the far north to a start in December  
25       near the 60th Parallel.

26                              And the other thing, sir, is  
27       that in the construction plan, some of the spreads  
28       that work in the north are not moved south to work  
29       during the summer season. Some are dedicated to the  
30       north, and they only work the winter seasons.





1 The reason for that, of course, is the shipping times  
2 on the Mackenzie River, where they would have to be  
3 shipped by barge, and there is literally not enough  
4 time to move them up the river to work in the south  
5 and then move them back before the river freezes.

6 Q It would also not be  
7 an appropriate time to ship too if assuming break-up  
8 and freeze-up are the beginning and end points of  
9 your construction period?

10 A You would have to make  
11 sure that you weren't caught one way or another, yes.

12 Q Now, dealing with break-up  
13 and freeze-up, what precise timing considerations have  
14 gone into break-up and freeze-up? Have you actually  
15 taken a particular length of time and said we will  
16 allow interruption <sup>of</sup> so many days in spring break-up  
17 and then you will allow consideration of so many days  
18 in fall freeze-up, when you will really have all  
19 your construction activities at a minimum.

20 A Are you talking about pipe-  
21 line construction?

22 Q No, I'm talking about all  
23 your construction activity now?

24 A Oh. Well first, let's deal  
25 with the pipeline construction. We developed a time  
26 frame for a particular spread, in which we said that  
27 we could operate between -- within this time frame  
28 when it would be winter conditions, and we did not,  
29 we will not do pipeline construction beyond that time  
30 frame.



1 Now, with respect to station  
2 construction, compressor station construction in the  
3 north, the stations will be built on gravel pads.  
4 Some of those pads will be constructed in the summer,  
5 because they are adjacent to borrow quantities in  
6 which we can construct an all weather road to the  
7 gravel pads. Others will be constructed in the winter  
8 where the borrow material will be hauled on snow  
9 roads for the gravel pad.

10 But once the gravel pad is built,  
11 it's possible to operate, do station construction 12  
12 months a year. In that case, break-up and freeze-up  
13 has no effect, because all of the construction  
14 activities are confined to the gravel pad.

15 Q You're saying then in  
16 station construction, it could take place over a 12  
17 month period, would there not be periods of time  
18 when in the northern areas, say northern Yukon, that  
19 your permafrost would be melting, you would have that  
20 active layer or something of that nature would in  
21 fact inhibit your construction?

22 A Not at a compressor station  
23 is site, sir. The gravel pad/of sufficient thickness  
24 that the 32 degree isotherm is within the gravel pad  
25 at all times, so therefore the active zone, if you  
26 want to call it that, is within the stable gravel  
27 pad, and you can work on it all year round.

28 Q I see. When would your  
29 construction of the gravel pad take place?

30 A It depends on each



1 individual site which in turn depends on the location  
2 of the borrow source. If the borrow source is rela-  
3 tively close to the station site, it may be possible  
4 to construct it during the summer. If it's a consider-  
5 able distance away, it would probably be more economic  
6 to haul the gravel in the winter on a snow road rather  
7 than build a long all-weather access road to the  
8 borrow site.

9 Q It's an economic consider-  
10 ation then?

11 A More than economic, sir.  
12 Certainly, the -- there are other considerations,  
13 certainly environmental considerations, depending  
14 on the circumstance at each site. You know, the  
15 stream crossings, the migration of animals and then  
16 so on, would all be considered before the final  
17 decision was made.

18 Q I see, so what you seem to  
19 be saying to me is you don't have an elaborate  
20 construction timing schedule, you know, except in  
21 terms of winter and summer. In other words, years,  
22 you know it's going to take you four years, but when  
23 you get to a specific site, you then have to go in  
24 and consider all those factors on that specific site,  
25 is that how it's been done?

26 A We have done that, sir.  
27 in developing the plan with the information that was  
28 available to us, and we have considered all of those  
29 factors to the best we can at this preliminary stage.

30 What I'm saying is that in the













Dau, O'RourkeWilliams,  
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1 Q So then it appears to me,  
2 that in your construction plan you have basically  
3 committed yourself to saying that that particular con-  
4 struction time frame is feasible and will be done.

5 A No, I've said that it's  
6 feasible and appropriate and we calculated costs and  
7 so on. I've said it can be done. Now, the Canadian  
8 Arctic Gas has accepted the plan at this stage,  
9 obviously.

10 Q They haven't?

11 A They have accepted it  
12 and it's filed, obviously, but I'm not sure that at the  
13 time of award of permits there may not be some minor  
14 changes in the plan. In other words, it's not engraved  
15 in stone at this time. There can be some minor  
16 changes, but not in the sense that we're going to  
17 start summer construction in the north or anything like  
18 that. But there could be a re-arrangement within the  
19 plan itself.

20 Q Fair enough.

21 A The basic concept is  
22 still correct, yes.

23 Q Right, but basically you're  
24 saying that it would be quite a surprise to you if it  
25 in fact took four years to get your gas from Inuvik,  
26 and five years to get your gas from Purdhoe Bay.

27 A That would surprise me,  
28 sir.

29 Q Would you go so far as  
30 to say it won't happen?



Dau, Williams, O'Rourke  
Cross-Exam by Veale

1                                   A     Well, I can't say that,  
2     sir.     I believe that this can be done in this time  
3     frame. I think it's an appropriate plan. I think there  
4     are sufficient resources to do this construction plan  
5     as outlined in the time frames outlined.

6                                   Q     I see. Basically your  
7     position then is that within that time frame there  
8     are going to have to be changes on various minor  
9     schedules, and there will have to be flexibility.

10                                  A     Absolutely.

11                                  Q     But you're quite sure  
12     that you can keep that time frame.

13                                  A     I'm convinced we can,  
14     sir.

15                                  Q     Now in your winter  
16     construction you talk about one mile per working day.

17                                  A     Yes sir.

18                                  Q     For a monthly rate of  
19     30 miles. Is that correct?     That's on page 3 of  
20     your transcript.

21                                  A     I said monthly rates of  
22     about 30 miles for winter are possible.

23                                  Q     Well, what in fact are  
24     you planning to do then?

25                                  A     The schedule is based  
26     on -- perhaps I could give you a particular example  
27     of a spread.

28                                  Q     Would it be appropriate  
29     to give me an example that I'm familiar with in the  
30     Yukon Territory?



Dau, O'Rourke, Williams  
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1  
2 Komakuk Beach or a spread near Old Crow?

3 MR. GENEST: Could Mr. Dau be  
4 allowed to answer the question, the previous question  
5 in his own way, and then if Mr. Veale is not satisfied  
6 with it he can pursue it?

7 MR. VEALE: I wouldn't want to  
8 interrrupt him.

9 THE COMMISSIONER: Well, can  
10 anybody remember what the previous question was?

11 MR. GENEST: I think it had  
12 something to do with the number of miles per day.

13 A I think I can respond,  
14 sir.

15 MR. VEALE: If you wish to  
16 respond by way of example, I don't think I have  
17 inhibited response.

18 A Spread in the construc-  
19 tion plan is located in the Yukon and the Northwest  
20 Territories, as I understand it, between Milepost  
21 313 and Milepost 372. The pipeline will be installed  
22 on the third winter season. There will be 59 miles  
23 to be installed by that spread, and again referring  
24 to the major pipeline installation activities, we  
25 have said that they can start as early as December  
26 1st but they must be completed by April 15th. The  
27 elapsed calendar time is 136 days. We have estimated  
28 that there will be 44 non-productive days for various  
29 reasons, which leaves 92 working days and therefore  
30 we would have to achieve a rate of 0.44 miles per





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1 calendar day or 0.64 miles per working day. The  
2 schedule, the plan is developed in that type of  
3 detail. Now, prior to December 1st, of course, there  
4 will be activities relating to snow road construction  
5 and so forth.

6 Q You mentioned calendar  
7 day and working day. What is the basic difference  
8 between the two in terms of the mileage?

9 A On a calendar day basis  
10 the production rate would have to be 0.44 miles per  
11 calendar day.

12 MR. GENEST: That's if you  
13 used every day.

14 A If you used every day,  
15 the average for the period of time; and the working  
16 days that we have calculated, we would have to have  
17 an average production each working day of 0.64 miles.

18 MR. VEALE: Q Have you  
19 calculated the number of hours that you would have  
20 in a working day at that particular construction spread?

21 A In a working day?

22 Q Yes sir.

23 A Yes, I have to go back  
24 to the plan as developed, the costs are developed on  
25 the basis that the crews will be paid for 12 hours  
26 per day. Now that doesn't necessarily say they are  
27 all actively working for all of those 12 hours.  
28 Obviously there is some transportation time in and  
29 out. Off the top of my head on a guess it's 10  
30 hours, say.



Dau, O'Rourke, Williams  
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Q That 12-hour day then,  
are you saying in fact that crews will work 12 hours  
a day, plus or minus a few hours, from start to  
finish, from December until April 15th?

A Yes, that will be the  
plan. They will -- what I'm saying, they are going  
to go to work at six o'clock in the morning and be  
home at six o'clock at night, for example.

Now they are not actively  
engaged in their construction activities in the field  
in that time frame, because obviously they have to be  
transported to where they're working and they have to  
get back to their camp.

Q O.K., what would be the  
hours of daylight at that construction spread during  
that time frame?

A It varies considerably,  
sir. There would be very little daylight on that  
spread.

Q How many hours would  
there be in December?

A I don't have it here.  
I suspect it's practically zero.

THE COMMISSIONER: That spread  
"F", that's the one you're still discussing, is it?

A Yes sir.

Q where is this chart  
with spread "F" on it?

MR. GENEST: We're looking  
at Fort Simpson, Exhibit 66, sir.



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1 THE COMMISSIONER: Oh,  
2 Exhibit 66.

3 MR. GENEST: Under 13-A  
4 construction plans, the first map.

5 THE COMMISSIONER: O.K.

6 MR. GENEST: The small "F"  
7 at the top of the page on the left-hand --

8 THE COMMISSIONER: That small  
9 spread "F" on the Yukon North Slope.

10 MR. GENEST: Yes sir.

11 THE COMMISSIONER: I shouldn't  
12 say "small spread F,"

13 A Small "F".

14 THE COMMISSIONER: It is the  
15 same spread.

16 MR. GENEST: Same spread.

17 THE COMMISSIONER: It's just  
18 the "F" is smaller on the --

19 A We have trouble with our  
20 draftsmen, sir.

21 MR. VEALE: We were speaking  
22 about the hours of daylight in December. Does the  
23 darkness have any effect on that 12-hour working day?

24 A I'm sure it has some  
25 effect, sir. The plan is to artificially light all  
26 the construction activities, obviously.

27 Q But did you take into  
28 account the productivity decrease that may result from  
29 continued darkness for long periods of time?

30 A Yes sir.



Dau, O'Rourke, Williams  
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1  
2 If you can give me one moment?

3 Q Certainly.

4 A I'm sure we have that  
5 information here in Yellowknife in our work papers.  
6 I don't have it with me. Perhaps I could respond to  
7 the question after the break. We do have -- we have  
8 calculated in our own judgment what we call in-  
9 efficiency, that varies over the whole project, and  
10 it's related to, as I recall, the unity in the summer.  
11 IN other words, it's related to productivity we would  
12 expect in a summer spread on the prairies, and  
13 then we have related the efficiency and productivity  
14 going back as the working conditions get worse really,  
15 with respect to daylight and temperatures and so on.  
16 I'm sorry, I don't have the information.

17  
18  
19  
20  
21  
22  
23  
24  
25  
26  
27  
28  
29  
30





1 Q Yes, I would be interested  
2 in that response if you would undertake to provide  
3 it.

4 I would assume that in working  
5 out your productivity factors then, you would apply  
6 those factors to each construction spread in determin-  
7 ing the length of time that would have to be spent at  
8 a particular spread, to lay a particular number of  
9 miles of pipe?

10 A I am not quite sure I  
11 understand that, sir.

12 Q Well productivity is a  
13 factor that you considered at spread camp F, in  
14 determining the fact that you would have to spend  
15 136 days at that spread camp?

16 A Yes, that's -- certainly  
17 that's part of it, yes. But the other thing, sir, is  
18 that some of the productivity decrease can be handled  
19 by an increase in labour force. You know, there are  
20 two things that occur.

21 The size of --

22 Q would you give me an example  
23 of that, for instance?

24 MR. GENEST: Would you let him  
25 finish his answer please, Mr. Veale?

26 A The size of a crew would  
27 depend on the -- on its location and productivity,  
28 and I'm sorry, I don't have that. We may have that  
29 information here too, I could perhaps respond to that  
30 later.



1 Q Would you --

2 A I don't have the specific  
3 example right now, but I'll see what I can get for  
4 you.

5 Q Thank you. Will your crews  
6 be rotating? In other words, in the month of December,  
7 I assume your crew won't work 30 days, but would a crew  
8 be pulled out of spread camp F during the course of  
9 that? Will it be two weeks on and two weeks off?  
10 Have you determined that?

11 A We have not determined that,  
12 sir, because in our view that's a matter of negotiations,  
13 labour negotiations prior to the start of the job.

14 We have, in our view, provided  
15 sufficient movement and people, for instance, with  
16 respect to the cost, to determine the feasibility of  
17 the project, but we have not said that they are two  
18 weeks in and two weeks out, or a month in and a week  
19 out, you know, we have not gone that far, no, sir.

20 Q What calculation have you  
21 made with respect to labour negotiations and the  
22 possibility of a labour strike?

23 A We have -- I don't under-  
24 stand the first part of the question. We have made  
25 no calculations with respect to labour strikes.

26 Q What consideration then  
27 have you given to the possibility of a labour strike?

28 A We have not given any  
29 consideration in our costs to a labour strike.

30 Q Is it possible then that



1 a labour strike that took place at several spread  
2 camps, could have some effect on your overall time  
3 frame?

4 A I can't visualize this  
5 project being built, sir, without a no strike agree-  
6 ment with labour.

7 Q Well you haven't answered  
8 my question. No strike agreements, I agree do exist,  
9 but no strike agreements are broken. Now, what  
10 happens if it's broken, and what does that do to your  
11 time frame?

12 A Well, it would depend on  
13 the amount of time that they were on strike, you know,  
14 that they weren't working. It certainly would affect  
15 the construction plan.

16 Q I see. It's conceivable  
17 then, that your three and four year projections for  
18 having gas running in the pipe, could be upset then  
19 by strikes?

20 A It could be upset, but I  
21 can't visualize that it would be upset to the extent  
22 that it would require another year, for instance.

23 Q I see. Did you then give  
24 consideration to a particular number of days on  
25 an overall basis, where there might be a slowdown in  
26 labour or a strike or something of that nature?  
27 How have you calculated that into your overall time

28 --

29 A We have not.

30 Q You have not. Now, have



1 you considered with your construction on say the  
2 north coast of the Yukon, that you're going to run  
3 into blizzard conditions which would force an actual  
4 shut-down of construction?

5 A Yes.

6 Q Now with respect to your  
7 example, spread Camp F, what amount of time would you  
8 have considered, of that 44 non productive days you  
9 mentioned, to be as a result of weather, in the form  
10 of a blizzard?

11 A I don't have a number for  
12 that, sir. It's included in the 44 days, obviously.

13 Q Would you be able to pro-  
14 vide me with a number if you got an opportunity to  
15 look for it?

16 A I'm not sure we have made  
17 the calculation; if we have, I would be glad to give  
18 it to you, sir, but I don't think we've assessed it  
19 in that amount of detail. This is a judgment number  
20 of the, essentially the percentage of time, for inst-  
21 ance, or the number of days within that time frame  
22 that we figure will be -- that will be non-productive.

23 Now I can't break it down  
24 further into, you know a blizzard or extremely cold  
25 temperatures or something like that. I don't think  
26 we have that information.

27 Q Well, have you considered  
28 the down time or non-productive time that would be  
29 involved in adhering to environmental measures, say  
30 on the north coast?





1 A Again I'm sorry, I don't  
2 quite understand what --

3 Q I'll give you an example.  
4 If you were building a snow road, and you were required  
5 to have a certain thickness of snow before you moved  
6 vehicles on the snow road, now if you had some diffi-  
7 culties in doing that in a particular length of time,  
8 that may in fact throw off your construction schedule  
9 for spread camp F.

10 Now, what kind of consideration  
11 have you given to that?

12 A I understand your question.  
13 That also would have to be included in that same type  
14 of a calculation as a non-productive day.

15 Q Well, what I'm really  
16 driving at is you've got 44 days there that are non-  
17 productive, and I'm wondering how you've allocated  
18 them.

19 A They were not allocated,  
20 sir.

21 Q They are not allocated?

22 A They are not allocated to  
23 the items that you're talking about, a blizzard or  
24 a late completion of a snow road. We've not broken  
25 the 44 days down into a whole series of neat little  
26 calculations. That hasn't been done, sir.

27 Q How did you arrive at the  
28 44 days?

29 A It's a judgment number.

30 THE COMMISSIONER: What events



1 did you take into account in setting aside 44 days,  
2 for days when no work would be done? Do the men get  
3 a day off each week, or were you anticipating that  
4 people would be ill? What events were you subsuming  
5 under that heading?

6 A It relates to weather  
7 conditions where you would be literally unable to  
8 work on some days. It certainly relates to the fact  
9 that you would probably be totally non-productive  
10 over the Christmas holidays and that you probably  
11 would get very little work done at that time.

12 It would not relate to, for  
13 instance, illness of a few workmen, because there  
14 would be back-up crews or back-up people available  
15 to replace them. It would relate to the -- a slightly  
16 later start, for instance, because of some peculiar  
17 difficulties with snow roads, I can't identify,  
18 but that would be in that classification.

19 We do not have a detailed  
20 analysis of all of these events. This is a judgment  
21 number that we think is appropriate. It's been  
22 developed as a result of discussions with contractors,  
23 and our own information.

24 THE COMMISSIONER: Well I under-  
25 stand that. Just so that there's no misunderstanding  
26 about an answer you gave to Mr. Veale earlier, in  
27 making that determination you have not considered at  
28 all the likelihood of work stoppages owing to labour  
29 disputes.

30 Now, I understand that you



1 don't anticipate that there would be any work  
2 stoppages owing to labour disputes because you intend  
3 to have a no strike collective agreement, but you  
4 haven't taken that into account?

5 A I have not, sir.

6 MR. VEALE:

7 Q Well Mr. Dau, just to pur-  
8 sue this a little further, in arriving at the 44 days  
9 out of the 136, is there anything that you can tell us  
10 now that you have actually considered, other than  
11 saying it is a judgment call?

12 A I think not, sir, I think  
13 that's the best I can do on it.

14 Q I would like to deal with  
15 construction spread camps and their location. Could  
16 you tell us what factors go into a decision as to  
17 where to locate a construction spread camp?

18 A Yes sir, north of  
19 the 60th Parallel we have attempted to locate  
20 all of the major pipeline construction spread camps  
21 on compressor station sites. We plan to prebuild some  
22 of those sites in a time sense. We will build them  
23 earlier so they will be available for the construct-  
24 ion spreads. Consequently, the spread camps are  
25 located some 40 to 50 miles apart, and they move,  
26 of course.

27  
28  
29  
30



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1 Q Would you say that part  
2 again?

3 A Yes, the compressor  
4 stations are located some 40 to 50 miles apart. It  
5 depends on each particular section of line, and if the  
6 contractors are installing more than 40 miles in a  
7 winter season, the camp would in some instances  
8 move. In other words he'd have to move his --

9 Q From one station to  
10 another?

11 A -- to another station  
12 site, yes.

13 Q Now is that the sum  
14 total of your decisions in terms of location of  
15 construction spread camps? Generally speaking they  
16 are on compressor station pads.

17 A Yes, I think they all  
18 are. Just one moment. Not all of them, sir. In  
19 -- on spread A in the first winter, it's first loca-  
20 tion happens to be at the work pad at the crossing  
21 of the Mackenzie River, and that's one instance that  
22 I can recall where it's not located at a compressor  
23 station site; but there is a work pad there that's  
24 required for the construction of the river. So it's  
25 on a gravel pad and so on. It then moves to a com-  
26 pressor station site.

27 Q I see. Well, maybe we  
28 can discuss spread camps that are in the Northern  
29 Yukon which are of interest to me, and in particular  
30 spread camp No. C at Komakuk Beach.





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1 THE COMMISSIONER: What number  
2 again, No. B?

3 MR VEALE: No. C, Mr. Commis-  
4 sioner.

5 THE COMMISSIONER: No. C,  
6 that's the one closest to the Alaska border?

7 MR. VEALE: That's correct.

8 THE COMMISSIONER: And is there  
9 in -- do we have anything a little larger in scale than  
10 just this one, Mr. Dau? Anything that gets <sup>us</sup> a little  
11 closer to that beach?

12 A Yes sir, there is. Yes  
13 sir, I'm trying to get the proper number here and I'm  
14 having trouble finding it.

15 MR. VEALE: The number is  
16 3-A-0211-1002.

17 MR. GENEST: You'll find that  
18 under the tab 2 in the construction plan exhibit, I  
19 take it.

20 MR. VEALE: It's toward the  
21 end of the maps in that section.

22 MR. GENEST: Towards the end,  
23 I have it.

24 A That, sir, is another  
25 instance where the camp is not located at a compressor  
26 station site.

27 MR. VEALE: Right.

28 THE COMMISSIONER: Excuse me.

29 I've got map 3-A-0211-1002, in front of me. Herschel  
30 Island is on the right-hand side of this map. Where is



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1 the spread?

2 MR. VEALE: Follow the coast along  
3 towards the Alaskan border and you'll run across  
4 Komakuk Beach.

5 THE COMMISSIONER:  
Oh yes, yes.

6 MR. VEALE: Komakuk air strip.

7 A And spread C  
8 constructs the pipeline from the Alaska-Yukon border,  
9 which is Milepost 195, over to Milepost 255, just  
10 south of Stokes Point.

11 MR. VEALE: Now there is a  
12 compressor station CA-05 nearby. I was wondering what  
13 considerations went into the location of spread camp C?

14 A Sorry, sir, I don't  
15 recall. I'll try and see if I can dig up some infor-  
16 mation for you.

17 Mr. VEALE: Maybe Mr. Genest can  
18 answer. When will this information come? Will it be  
19 this afternoon or --

20 A I would hope to  
21 respond to it after the break, sir. I'll try to,  
22 I can't guarantee it.

23 Q Well maybe I  
24 can refresh your memory on it to some extent.  
25 That may be a previous Dew Line site.

26 A It is, sir.

27 Q It is, and would that  
28 have had some effect on your location considerations?

29 A Yes, of course, because  
30 that site in the past has had material delivered to it



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1 by barge and there is an existing air strip, there  
2 is a facility there is really what it is. I'm sure  
3 that had some consideration. There's a road from  
4 the beach up to the site and so on.

5 Q I have some questions  
6 to ask relating directly to spread camp C. Are you  
7 able to answer them now or would you like --

8 A I'll try.

9 Q When would the first  
10 construction activity -- and I'm referring to overall  
11 now, not just pipeline per se -- when would it begin  
12 at spread camp C?

13 A The facilities for the  
14 stockpile site that would be required for spread C  
15 would be constructed in the summer of '78. Prior to that  
16 there would obviously be the surveying, any soils  
17 investigation that was necessary and things like that.  
18 These are more the engineering functions.

19 Q Right.

20 MR. GENEST: Excuse me. Mr.  
21 Commissioner, I just wonder if we couldn't reduce these  
22 dates to a number. We are going to --

23 MR. VEALE: Summer 1, summer 2,  
24 summer 3.

25 MR. GENEST: -- summer 1, summer  
26 2, summer 3, because to try and relate all these back  
27 to the application date, the revised date, and the  
28 realistic date, none of us are going to what --

29 MR. VEALE: I wish you'd thought  
30 about that yesterday.



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1 MR. GENEST: That's right.

2 Would that be the first summer, the second summer?

3 Regardless of the date I think you could --

4 MR. VEALE: Q Summer 1 would  
5 be the survey summer, is that correct, Mr. Dau?

6 A All right. If we're  
7 relating it to other facilities and you want to expand  
8 on this, summer 1 should be the summer of 1976 to  
9 get it back into -- tie it down to something. So  
10 therefore the stockpile sites for spread C would be  
11 constructed in the third summer.

12 Q Third summer?

13 A Yes sir. The survey and  
14 soils investigation work necessary for that would  
15 be done in either the second or first summer. I 'm sure  
16 some would be done in the first summer; the majority  
17 in the second summer.

18 Q I see.

19 A Construction itself  
20 would take place --

21 THE COMMISSIONER: Well, when  
22 you say "summer 2 is the summer of 1976," excuse me,  
23 summer 1 is the summer of 1976, --

24 A I've just arbitrarily  
25 done that, sir.

26 Q Yes, well if you look  
27 at your graph --

28 A Yes sir.

29 Q -- which is under the  
30 heading:





Dau, O'Rourke, Williams  
Cross-Exam by Veale

1 "Resources,"

2 which I just tore out so I wouldn't have to keep  
3 finding it

4  
5 Summer 1, you don't count '75  
6 on your graph as summer 1. This whole program starts  
7 with winter 1, '75-'76.

8 A All right, sir.

9 Q So this summer '75 should  
10 not be treated as summer 1, even on your graph, except-  
11 ing this graph as completely accurate.

12 A Right, sir, yes.

13 THE COMMISSIONER: All right.  
14 So we really start with winter 1 if we look at this  
15 graph, and then go to summer 1.

16 A All right, winter 1 on  
17 that basis, sir, is the winter of --

18 Q '75-'76.

19 A -- '75-'76.

20 Q And summer 1 is the  
21 summer of '76.

22 A O.K., sir.

23 THE COMMISSIONER:  
24 And then just so we all  
25 know where we're at, we add two years to each of those.

26 MR. VEALE: Now, would you be  
27 able to provide me now with going through chronologically  
28 from summer 3 to winter 3, to summer 4 to winter  
29 4 , etc, and tell me the exact buildup in terms of  
30 men and in terms of stockpiling equipment?

A No sir, I couldn't do



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1 it in that amount of detail. I would have -- to make  
2 sure I understand are you asking for the number  
3 of people, number of workmen on spread C by season,  
4 by years?

5 Q That's right. In other  
6 words, if you are going to start off, say, with soil  
7 samplers, you're going to have a crew there. How  
8 many men would be in that crew, and then you're  
9 going to move onto survey, how many men would be in  
10 the survey crews working on that particular spread camp?  
11 Then you're going to go on to stockpiling and so on  
12 and so forth.

13 A I'm sorry, sir, I don't  
14 have that amount of detailed information with me here,  
15 that would take some time to get that and work it  
16 out. I can tell you some of the detail but I don't  
17 have it all.



1 MR. GENEST: Can we try some  
2 and see how it does?

3 A Yes, for instance --

4 MR. VEALE: Sure.

5 A -- on spread C in the third  
6 winter, our estimate of the total labourforce for the  
7 mainline contractor is 719. That does not include  
8 the owners, construction managers and engineers'  
9 staff, which would add another 15 to 18 percent to  
10 that.

11 Q That's pipeline construct-  
12 ion?

13 A Pipeline construction.

14 Q Right.

15 Are we going to work back, then?

16 A I'm sorry, sir, but that's  
17 about all of the detailed information I have here.  
18 The -- we can -- as I told you the survey crews and  
19 soils investigation crews are going to be from 10 to  
20 50 at various times. The compressor station crews  
21 will be on the order of 200. The stockpile site crews  
22 would be in the order of 50 to 100, but to go beyond  
23 that, I would have to get some further information  
24 from Calgary.

25 Q I see.

26 THE COMMISSIONER: What was the  
27 figure you gave us for winter three which is the peak  
28 employment period for the spread? What was the figure  
29 you gave us?

30 A 719.



1 MR. VEALE:

2 Q Are you aware of how many  
3 survey crews would be involved in that particular  
4 spread camp?

5 A Well, in the survey pro-  
6 cedure, there would be a location, survey location  
7 performed on the pipeline right-of-way the previous  
8 summer, which would be a very small crew.

9 Q How many men would that  
10 be?

11 A I would say less than 20.  
12 It's --

13 Q And there would only be  
14 one crew for that particular --

15 A For that particular section  
16 in the summer, yes sir.

17 Q Right.

18 A And during the course of  
19 construction, there would be a very small survey crew  
20 preceding the construction activities to confirm its  
21 location, make sure they're exactly where they're  
22 supposed it would be. It would stake out the ditch  
23 line, for instance, and then as I said yesterday,  
24 there would be a crew that would provide the "as  
25 built" information to record exactly how everything  
26 was installed, but all of those people wouldn't total  
27 10 or 12 or something like that. It's not a big  
28 operation in survey.

29 Q I see. What about heli-  
30 copter support for your initial location survey crew?





1 A That would be required,  
2 sir.

3 Q And what kind of helicopter  
4 support would you have for that survey crew at spread  
5 camp C?

6 A Probably one helicopter.

7 Q One helicopter. Now is  
8 that helicopter an independent contractor or is he an  
9 employee of Arctic Gas?

10 A No, he would be an indepen-  
11 dent contractor, I'm sure, sir.

12 MR. VEALE: Mr. Commissioner,  
13 at this particular time, it was my intention to deal  
14 with three specific spread camps, and I believe we  
15 are going to have some difficulty. Obviously you  
16 can't have that information at your fingertips, and  
17 I would be interested in having all the information  
18 in the way that I've asked for it in terms of seasonal  
19 number of men, amount of equipment, so that the  
20 progression can be seen and then certain considerations  
21 can be given to impact on people and environment.

22 Now, the areas that I'm inter-  
23 ested in, I'm interested in Komakuk Beach, spread  
24 camp C. I'm also interested in Shingle Point, which  
25 is spread camp E, and the third area that I'm inter-  
26 ested in is the spread camp which is situated not  
27 too far from Old Crow, it's spread camp A, approxi-  
28 mately mile 335.

29 THE COMMISSIONER: Spread camp  
30 A near Old Crow?



O'Rourke, Dau, Williams  
Cr. Exam. by Veale

1 MR. VEALE: Yes, that would be  
2 on the -- you would have to look at your maps on the  
3 alternate routes and corridors.

4 THE COMMISSONER: Oh, I see.  
5 Well, I was going to ask about that. You have supplied  
6 the locations of the proposed spread camps for the  
7 alternate route through the Richardson Mountains,  
8 have you?

9 A I believe the location is  
10 shown, but I do not have the same amount of detail.

11 THE COMMISSIONER: Yes, I think  
12 that that's quite important. Mr. Veale represents  
13 the people at Old Crow. That alternate route has  
14 been before us ever since the application was filed,  
15 and it depends on the -- on what occurs in connection  
16 with regulatory proceedings, both here and -- both  
17 in Canada and in the United States, and I think that  
18 the Inquiry will likely go to Old Crow early in July,  
19 and I think it is very important that all the detail  
20 you can supply the Inquiry with, regarding that spread  
21 camp A on the alternate route, the interior route,  
22 should be available.

23 And this is really for Mr.  
24 Genest as well as yourself, Mr. Dau.

25 A I will do all I can sir.  
26 I will get as much information as I can.

27 MR. VEALE: I see. Just if  
28 there were to be some cross-examination on that, I  
29 wonder what the timing of that would be. How long  
30 would it take you to obtain that kind of information?



1 A Can I respond after the  
2 coffee break, sir? I will have to --

3 MR. VEALE: Are we having the  
4 coffee break?

5 THE COMMISSIONER: Yes, well  
6 let's have the coffee break.

7  
8 (PROCEEDINGS ADJOURNED)  
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Dau, O'Rourke, Williams  
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(PROCEEDINGS RESUMED PURSUANT TO ADJOURNMENT)

MR. GENEST: Mr. Commissioner,  
Mr. Dau has informed me, and perhaps he can deal with  
it himself, that the information we were discussing  
just before the break is not -- has not been done to  
the degree of detail in which it is being sought. It  
is possible to do it for the three spreads about  
which Mr. Veale has asked questions by involving about  
three or four people for about a week. Is that what  
I understand, Mr. Dau?

WITNESS DAU: Yes.

MR. GENEST: And we couldn't  
therefore get it in time for today or this week. It  
would take us a week to get it under way.

My concern is that -- and it  
may be something, I would leave that to you, sir --  
is that if we have to do it for every spread, all the  
way down the Yukon border, the Yukon-Alaska border to  
the 60th Parallel we are looking at quite a thorough  
and long engineering exercise, and I was asking my  
friend, Mr. Veale, if perhaps these requests could  
be limited to typical ones where we could do the  
work, for instance I was thinking of Old Crow especially  
where there are people who are affected by these  
activities, we might have something more manageable.  
I'm in your hands in that respect, sir.

THE COMMISSIONER: Well, what  
do you think about all this, Mr. Veale?

MR. VEALE: Well, Mr. Commis-  
sioner, I chose those three as representing typical





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1 concerns in the pipe passage across the Yukon. I would  
2 be willing to limit it, say, to one site, and I  
3 would choose Komakuk Beach on the North Slope, and  
4 then the spread camp A near Old Crow, if that would  
5 be of any assistance to Mr. Genest; but I would insist,  
6 though, on having the information on those two spread  
7 camps and I would be prepared to come back at a later  
8 date after I had received the material to discuss it  
9 with Mr. Dau.

10 THE COMMISSIONER: Can you  
11 manage two spread camps, Mr. Dau?

12 A Yes, we can get that  
13 for you. It would -- we can't get it by Wednesday  
14 night, unfortunately.

15 MR. VEALE: No, no.

16 A We have to go back to  
17 Calgary, but we can certainly do that for you, yes.

18 MR. GENEST: Would you like  
19 to have it, sir?

20 THE COMMISSIONER: Yes, I  
21 think we should. I don't know whether Mr. Veale is  
22 settling for two out of six, or whatever, but he  
23 seems to be quite reasonable on that subject. Two  
24 would be satisfactory.

25 MR. BELL: Excuse me, sir,  
26 while we're on the subject, would it be possible  
27 also to get an example for a spread camp in the  
28 delta and somewhere further down the valley as well,  
29 the same information?

30 MR. GENEST: Well, could I



Dau, O'Rourke, Williams  
Cross-Exam by Veale

1 suggest to my friends that before we break by Wednesday  
2 that they give us a list of what they would consider  
3 typical? I ask them to be reasonable about the number,  
4 and then we'd have some agreement that-- as to the  
5 typicalness of what work we've done. Would that be  
6 satisfactory, Mr. Bell?

7 MR. BELL: That would be fine,  
8 Mr. Genest.

9 MR. GENEST: And if Mr. Bayly  
10 is interested in the same subject, perhaps we could  
11 have his input on this as well.

12 MR. BAYLY: I'll do that, sir.

13 MR. VEALE: Q Mr. Dau, thank  
14 you for your undertaking in this matter. What I would  
15 like to do now is talk about spread camp, I believe  
16 it's A, which is located near Old Crow, to determine  
17 your present knowledge and the input that has gone  
18 into the selection of that site at this preliminary  
19 stage.

20 A While we're getting that  
21 map out, sir, perhaps I could respond to one of the  
22 questions you asked regarding productivity, and I did  
23 some calculations on the assumption that the producti-  
24 vity was unity in the prairies. The cost estimates  
25 and so on that we prepared are based on about 0.9  
26 productivity just north of the 60th Parallel; about  
27 0.7 in the general Inuvik area near the delta; and  
28 about 0.6 along the Arctic coast.

29 Q Sir, I didn't catch what  
30 they relate to.



Day, O'Rourke, Williams  
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1 A They relate to 1, unity,  
2 on summer construction work.

3 Q I see, so would you  
4 repeat that what it would be on the coastal slope?

5 A About 0.6, in other  
6 words 60%.

7 Q 0.6, 60% productivity?

8 A -- compared to 100% on  
9 that basis.

10 Q I see.

11 A Prairie work in the  
12 summer.

13 Q I see, and that 60% went  
14 into your value judgment on that 44 days we were  
15 discussing at spread camp E.

16 A No sir, not the 44 days.  
17 The 60% is a judgment that went into the amount of  
18 work that could be done in the remaining days. In other  
19 words if the total calendar time frame is 136 days,  
20 in our judgment we have 44 non-productive days. There  
21 are 92 days left, and the 60% then relates to the  
22 amount of work that can be accomplished in the 92  
23 days.

24 THE COMMISSIONER: You have  
25 two crews, one working ten days steady on the North  
26 Slope, the other working ten days steady in Southern  
27 Alberta, you get 60% as much pipe laid on the North  
28 Slope.

29 A That's generally true,  
30 yes.



Dau, O'Rourke, Williams  
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1 MR. VEALE: Q So then your  
2 60% productivity then is calculated in the actual  
3 days required to lay the pipe, it's not calculated  
4 into the non-productive time.  
5

6 A Right, the other way  
7 around, it's how much we can lay in the 92 days, yes.  
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1 Q Do you have that map in  
2 front of you?

3 MR. MARSHALL: What's the  
4 number, Mr. Veale?

5 MR. VEALE: The map number is  
6 -- this is in the alternative corridor drawings, sub-  
7 section 14.e.1.10. The map is drawing number 3B0211-  
8 1003.

9 WITNESS DAU:

10 A I have it, sir.

11 Q Okay now. By my calculat-  
12 ion, that spread camp A is probably within the vicinity  
13 of 20 miles of Old Crow. Do you have any specific  
14 knowledge on that? Is that approxiately correct?

15 A That's approximately  
16 correct, sir.

17 Q Now, it also appears to me,  
18 and correct me if I'm wrong, that that spread camp is  
19 not located at compressor station IA08?

20 A That's correct, sir.

21 Q Now IA-08 is not too far  
22 from it, however, I would say about 15 miles. Now,  
23 what would have been the location consideration that  
24 would lead you to place it in the location it is,  
25 rather than the compressor station?

26 A I can't recall right now.  
27 I'm sorry, sir, I can't respond to it. I don't know.  
28 I can get the information for you.

29 Q Would that be information  
30 you could get today, or is that --



1 A I will certainly try, sir.

2 THE COMMISSIONER: What drawing  
3 are you looking at, Mr. Dau?

4 A 3B-0211-1003.

5 MR. VEALE:

6 Q Mr. Dau, I am prepared to  
7 defer that until the afternoon then, and we can get  
8 into that question later on.

9 A I will do all I can, sir.

10 THE COMMISSIONER: How far is  
11 that spread, you're speaking of the spread at Mile-  
12 post 335, are you?

13 MR. VEALE:

14 That's correct.

15 THE COMMISSIONER:  
16 And how far is that from  
17 Old Crow?

18 MR. VEALE: Well, my estimation  
19 would be 20 miles, but I'm sure you will be able to  
20 provide us with a more accurate one.

21 THE COMMISSIONER: And the  
22 compressor station you spoke of was about --

23 MR. VEALE: Mile 350.

24 No, that wouldn't be correct,  
25 a little this side of Mile 350.

26 A I would think the airline  
27 distance between Old Crow and that spread camp at  
28 Milepost 335, would be something a little, less than  
29 10. By road it would probably be 12 to 15, and the  
30 distance from the spread camp at Mile 335 to the  
station appears to be about 12 miles.

MR. COMMISSIONER: Thank you,



1 Mr. Dau.

2 MR. VEALE:

3 Q You said that the road  
4 distance between Old Crow and spread camp A is 12  
5 miles?

6 A I'm guessing, I would have  
7 to scale it, sir, but I'm talking about the snow road  
8 that's shown on the map.

9 Q Right.

10 THE COMMISSIONER: Now, Mr.  
11 Veale, you're not giving evidence, but this -- that  
12 is Old Crow Flats that lies to the north and to the  
13 east of Old Crow, is it, on this map?

14 MR. VEALE: That's correct. It  
15 would lie to -- yes, directly north would be the  
16 major body of Old Crow Flats, and to the northeast  
17 would be what they call Little Flats. Little Flats  
18 would be, in other words, to the right of the Old  
19 Crow River.

20 Q Mr. Dau, what I would  
21 propose to do then this afternoon is discuss all the  
22 factors relating to the location of that particular  
23 spread camp and go into it in some detail.

24 A Right, sir.

25 Q Mr. Dau, it's been my  
26 feeling that you have two routes going across the  
27 Yukon that you're interested in; one on the coast  
28 and one on the interior.

29 Now, apparently Arctic Gas  
30 prefers the Yukon coastal route to the interior



1 route, is that correct?

2 A Yes, sir.

3 Q Now, has that had -- that  
4 particular decision, has that had any effect on the  
5 -- on your construction plan with respect to the  
6 interior route? In other words, have you tended to  
7 treat that as a secondary route from your construction  
8 plan point of view and concentrate on the North  
9 Slope? You know, in terms of the attention you've  
10 given to the various routes, has your attention been  
11 equal to both routes from a construction viewpoint?

12 A At the time the application  
13 was made, it would have been equal. I'm sure we have  
14 more information on the coastal route now than we do  
15 on the interior. That's since the period of time of  
16 filing the original application.

17 Q I see. But at the actual  
18 time of the application then, I take it that you  
19 would have given equal consideration to both routes?

20 A That is correct, sir.

21 THE COMMISSIONER: If that  
22 spread camp A near Old Crow were of the same size as  
23 the spread camp F at the beach on the North Slope,  
24 Komakuk.

25 A <sup>be</sup> It would/very similar,  
26 yes, sir.

27 Q So you would have at the  
28 peak winter construction period something like 800  
29 men at that.

30 A Yes, sir.





1 MR. VEALE: Perhaps we will get  
2 into that this afternoon, I hope.

3 Q Mr. Dau, I was wondering  
4 if you would give me some of the names of the people  
5 that have been involved in your decision making.  
6 Now, you have mentioned that you have a number of --  
7 you mentioned these meetings in April of '73. Now,  
8 I understand that you had input about the people of  
9 the north from Gemini north. Would they be consultants  
10 that were advising you on the interests of the  
11 people?

12 A They attended the meeting.  
13 They were retained by Canadian Arctic Gas and were  
14 present in the meetings, and of course as the  
15 minutes note, had many comments, yes.

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Dau, O'Rourke, Williams  
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1 Q Were you in fact relying  
2 on their information?

3 A Yes.

4 Q And do you recall who  
5 the people were?

6 A From Gemini North?

7 Q Yes.

8 A Pat Carney, Frank Basham.

9 Q There was one other name  
10 that I came across, Eric Gordeau. Was he also involved  
11 on a consulting basis?

12 A He's with the Environ-  
13 mental Protection Board, sir, not Gemini North.

14 Q I see. Now, did you  
15 have any discussions with Gemini North on the relation-  
16 ship of their input to your ultimate decision-making?  
17 Did you have a methodology of saying, "Well, we're  
18 running a pipe down here, now how are we going to  
19 funnel your information in and how are we going to  
20 treat that information?"

21 A We provided -- the way  
22 they got information from us was on the basis of route  
23 maps and construction plans similar to what we have  
24 filed. That type of information was provided to  
25 everyone for that particular meeting, for instance, and  
26 of course with respect to the consultants retained by  
27 Northern, had been provided over a long time frame.  
28 Canadian Arctic Gas would have to speak to the time  
29 that Gemini were given the information that we provided  
30 Canadian Arctic Gas. I'm not sure I've understood your



Dau, O'Rourke, Williams  
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1 question completely.

2 Q I wasn't sure I under-  
3 stood the answer.

4 THE COMMISSIONER: I didn't  
5 understand either. Let's do that again.

6 MR. VEALE: What I'm trying to  
7 determine is just how you were able to use these people  
8 to formulate your construction plans. Now you were  
9 using Pat Carney and you mentioned Frank Basham.

10 MR. MARSHALL: I believe he  
11 said that they were retained by Arctic Gas, not by  
12 Northern Engineering.

13 MR. VEALE: Well, more  
14 precisely then, did you establish any methodology in  
15 terms of how you dealt with their input, or was it  
16 strictly a value judgment again?

17 A We considered obviously  
18 the comments they made in the April and May meetings.  
19 It was an input into our planning. We had no special  
20 method of dealing with them and exchanging information,  
21 discussing with them. I can't recall any specific  
22 meetings to discuss particular problems. I am aware that  
23 they were in our office on several occasions discussing  
24 matters of route location and construction timing and  
25 planning, but I have no details of the results of those  
26 meetings. I'm just aware that the conversations went  
27 on.

28 Q well, the question I'm  
29 going to ask you may wish to defer to this  
30 afternoon, if you wish; but did you in fact have



Dau, O'Rourke, Williams  
Cross-Exam by Veale

1 discussions with Pat Carney and Frank Basham about  
2 Old Crow?

3 A I can't recall, sir.  
4 I would have to look up in the Minutes of the meeting  
5 and check with Calgary.

6 Q Well, there is one thing  
7 that struck me in my perusal of some of these Minutes,  
8 and that was on the April 13th session.

9 A Yes sir.

10 Q It talks about meeting  
11 A, Imperial Oil Conference Room.

12 A One moment, please.  
13 Found it.

14 Q Were you at that session  
15 on April 13th?

16 A I don't recall being  
17 there.

18 Q Well, would you be able  
19 to recall whether or not you had any specific discuss-  
20 ions with either Pat Carney or Frank Basham with res-  
21 pect to Old Crow?

22 A I didn't, sir.

23 Q You didn't?

24 A I don't think I did, sir,  
25 no.

26 Q I see. Well that would  
27 probably correspond with, I think, what Pat Carney  
28 said, and I would refer you to that April 13th session,  
29 it says:

30 "Pat Carney,"





Dau, O'Rourke, Williams  
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1 it says:

2 "Carney three main concerns."

3 THE COMMISSIONER: What page  
4 is this?

5 MR. VEALE: There's no page  
6 number, page 1, I believe, but there's no number on it.

7 THE COMMISSIONER: Well, this  
8 is April 13th?

9 MR. VEALE: That's right,  
10 April 13th session at the top of the page.

11 THE COMMISSIONER: I have the  
12 transcript here which is Exhibit 85.

13 MR. VEALE: Towards the end of  
14 that transcript.

15 MR. MARSHALL: It's exhibit 84a sir.

16 THE COMMISSIONER: Oh, 84-A.

17 MR. MARSHALL: And it would be about  
18 20 pages, 30 pages from the back of that. There is  
19 Minutes of Meeting A, Imperial Oil Conference Room,  
20 there is some 20 pages that are numbered at the top  
21 of the page, and it's on the first page headed:

22 "April 13th session."

23 THE COMMISSIONER: All right.

24 MR. VEALE: Now, it starts  
25 off and says:

26 "Carney - three main concerns:

27 (1) Do not have any useful input on Old Crow  
28 (not authorized to do any work there, and were  
29 asked to stay out of there by the government  
30 this spring)."

Now, would that represent



Dau, O'Rourke, Williams  
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1 the information that you would have received with  
2 respect to Old Crow, or would there have been other  
3 meetings?

4 A I'm sorry, sir, I can't  
5 recall any other meetings with Gemini North specifically  
6 with respect to Old Crow. Sorry, I just can't recall  
7 them.

8 Q Do you recall this  
9 particular reference or comment that apparently was  
10 made by Pat Carney?

11 A I have read the  
12 Minutes and I have read them shortly after they were  
13 issued, sir.

14 Q I see, but you weren't  
15 present at that particular time?

16 A I'm pretty sure I wasn't  
17 sir, not at that one.

18 Q Was Mr. Williams present  
19 at that time?

20 A Yes, he was.

21 Q You were there, Mr.  
22 Williams?

23 WITNESS WILLIAMS: It appears  
24 that I was there. I think my name appears on that  
25 day.

26 Q Can you be more definite  
27 about that?

28 A Yes, I was there. It  
29 appears I didn't have much to say that day.

30 Q Did you recall that



Dau, O'Rourke, Williams  
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1 comment made by Pat Carney?

2 A Oh, I think vaguely.

3 Q Well, did you make any  
4 request of her to provide you with information about  
5 Old Crow, and did you subsequently receive any infor-  
6 mation about Old Crow?

7 A No, and no.

8 Q Thank you. Mr. Williams,  
9 I gather your initials appear on these maps we've  
10 got. Is that correct? "G.L.W.".

11 A Yes sir.

12 THE COMMISSIONER: In the transcript  
13 there is a passage, this comes under the heading of:  
14 "Miscellany".

15 Somebody uses the phrase:

16 "creating the least impact mammalwise." Societal  
17 infrastructure, man is back at work.

18 MR. VEALE: Q Mr. Williams, I  
19 would refer you to the maps in your construction plan  
20 under "Pipeline Construction Schedule," and the number  
21 of the map is 402151001. In other words, the first map  
22 in that section.

23 WITNESS DAU:

24 A Is that on the interior  
25 route, sir?

26 Q No, it's in the main  
27 construction plan. MR. MARSHALL:  
28 Would you give me that number  
29 again?

30 MR. VEALE: It's 4-0215-1001.  
Now,  
I only refer to that particular one, they are  
actually all the same maps in that section but they



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1 just have different information on each one.

2 Q Now, you're aware of the  
3 -- you're aware of this map, I presume those are your  
4 initials in the corner, would that be correct?

WITNESS WILLIAMS:

5 A Yes sir.

6 Q And what was your function  
7 in putting your initials on that map?

8 A To make a final  
9 check after the map was produced.





1 Q Well, can I ask you if  
2 you're aware of the location of Old Crow, just as a  
3 general matter? You don't have to refer to the map.

4 A Yes, I've been there.

5 Q And where is it located?

6 A In the northern part of  
7 the Yukon Territory, south of Old Crow Flats.

8 Q And it would be at the  
9 confluence of what rivers?

10 A The Porcupine and Old  
11 Crow River.

12 Q Well just referring to  
13 that map, I was somewhat concerned to see the location,  
14 the apparent location of Old Crow.

15 THE COMMISSIONER: Well I wish  
16 I could -- what map is this again? I'm sorry.  
17 This is the interior route map?

18 MR. VEALE:

19 Q Am I correct in my observat-  
20 ion that Old Crow is now in Alaska?

21 A I'm embarrassed sir, yes.

22 Q You wouldn't have happened  
23 to use Pat Carney in assisting you in drawing these  
24 maps, would you?

25 A No sir, as Mr. Dau mentioned  
26 yesterday, I think we are in/a new slate of draughts-  
27 men.

28 Q What about the people that  
29 check the maps?

30 A Sometimes they would like



1 to get off the project too.

2 Q While we are onto the map  
3 situation, I have another matter of confusion that  
4 I'm sure either yourself, Mr. Williams, or Mr. Dau  
5 can clarify, and I would ask you to refer to the map  
6 with the construction spreads on the north coast  
7 route.

8 A This is 3-0215-1001?

9 Q I'm now moving into the  
10 proposed pipeline route map section, and that would  
11 be 3A- 0211-1002.

12 A Yes, I have it.

13 Q And the map just following  
14 that, which would be 1C-0211-1001?

15 A Yes, sir.

16 Q Now, it appears to me, if  
17 you look at the information on spread camp C which is  
18 at Komakuk Beach on the first map, that the pipe  
19 laid will be from Milepost 195, which would be the  
20 actual border between the Yukon Territory and Alaska?

21 A Yes, sir.

22 Q To Mile 244? Now, do you  
23 follow me there?

24 A Yes, and I'm also aware  
25 of some errata on these sheets.

26 Q Maybe we can deal with that  
27 now then, but the one that I am concerned about is  
28 spread camp E, the one located at compressor station  
29 CA06. Now that indicates the pipe will be laid from  
30 Mile 285 to Mile 254.



O'Rourke, Dau, Williams  
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1 A Yes, sir.

2 Q Now that leaves a, the way  
3 I look at it and you can possibly explain it, but it  
4 leaves a 10 mile gap in your pipe. Is that correct,  
5 or --

6 A Yes, that's correct.  
7 There is an error there, yes.

8 Q But it appears that at  
9 your spread camp C, you've actually stockpiled just  
10 enough pipe to take you to Milepost 244?

11 MR. MARSHALL: Well Mr. Veale,  
12 it's marked on the -- with a line shown where the  
13 pipeline location is. The dividing point between  
14 spread C and spread E and you can see it is just beyond  
15 Milepost 250, between 250 and 260. It's shown there.  
16 It appears there must be a typo in the little box in  
17 the top of the first of these two maps, which is "pipe  
18 laid Milepost 195 to 244." Perhaps that should read  
19 "254." To correspond with what is shown on the rest  
20 of the pipe.

21 MR. VEALE: Well thank you, Mr.  
22 Marhsall, but I would like to ask further questions  
23 on this from Mr. Williams.

24 WITNESS WILLIAMS:

25 A Yes, somewhere here I have  
26 an errata sheet, but I might be able to get that  
27 information if you will just bear with me for a moment.

28 Q Okay.

29 A It's the pipe delivered  
30 to Komakuk Beach should read 59 miles, and then the



1 pipe laid from 95 to 254.

2 Q Tell me, have you ever, in  
3 your construction experience, ever had an occasion  
4 where an error of that nature was actually something  
5 that showed up when you were in the field? Do errors  
6 of that magnitude ever occur?

7 A Well not/<sup>to</sup>the same extent  
8 as these, I don't think. These were put out in a  
9 rather rushed manner and didn't get the checking that  
10 they would get if they were drawings for construction.

11 Q What would happen, if in  
12 spite of all the checking you did, you in fact, you  
13 know, were short two or three pieces of pipe?

14 A Well I wouldn't see an  
15 error of this magnitude happening for a pipe order  
16 or for construction, and the general procedure is  
17 to oversupply pipe by a small percentage to take care  
18 of damage that might occur in transit and so forth.

19 If such a thing happened that  
20 this one particular spread was short three or four  
21 joints of pipe, I would guess they would pick it up  
22 from the adjacent spread by winter or snow road.

23 Q Okay, well that's precisely  
24 what I would like to draw your attention to. If  
25 you're putting the pipe, you're laying the pipe  
26 along the coastal route in the north Yukon, how would  
27 you bring the pipe in? Well let's assume you have a  
28 construction deadline, you want to complete a certain  
29 portion of that pipe laying in the winter so that you  
30 can put the gas through.





1                   Now, if you didn't actually --  
2 if you took the pipe from another spread, you might  
3 involve yourself in a shortage somewhere along the  
4 line. Is it possible for you to get pipe into that  
5 area, you know, once it's freeze-up?

6                   A     By winter road, yes, it  
7 would be possible.

8                   Q     Well --

9                   A     In this case along the  
10 right-of-way. These two spreads C and E are working  
11 towards one another when they get there if there's  
12 a hundred foot gap, pipe could be brought       into  
13 one of those locations.

14                   I think along this route, at  
15 CA05, for instance, there's a 6,000 foot strip. In  
16 a pinch for a few joints that you're talking about,  
17 they could be flown in by Hercules.

18                   Q     I see. So they would be  
19 brought in by Hercules and they would be just lifted  
20 in the air from some other site, maybe Fort McPherson  
21 or some other stockpile, is that correct?

22                   A     Certainly there would be  
23 a surplus pipe supply somewhere, yes, and generally  
24 by spreads. I'm sorry, sir.

25                   THE COMMISSIONER: Can a  
26 Hercules land at that spread, spread C?

27                   A     CA05, there's an indicated  
28 6,000 foot strip there sir, yes, and a Hercules could  
29 land there.  
30



1 MR. VEALE:

2 Q And there's no difficulty  
3 in transporting your pipe length in a Hercules?

4 A The pipe can be cut to the  
5 length that the Hercules could handle. It doesn't  
6 have to be in 40 foot lengths or 60 foot lengths. It  
7 can be cut. I certainly wouldn't see this happening,  
8 but it's possible.

9 Q Have you ever considered  
10 that particular problem in terms of how much can a  
11 Hercules carry, in terms of length of pipe?

12 A No, I don't recall working  
13 that out. I think we probably could. The pipe weighs  
14 a little less than 400 pounds per foot.

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Dau, O'Rourke, Williams  
Cross-Exam by Veale.

1 Q Mr. Dau, getting back to  
2 those meetings you had in April, 1973, could you put it  
3 on the record who your consultants were from an  
4 environmental point of view?

5 WITNESS DAU: Can I? Yes, we  
6 retained L.G.L. Limited, who were consultants with  
7 respect to birds.

8 MR. GENEST: I thought we already  
9 had all of that on the record. I may be mistaken,  
10 repetition won't harm.

11 THE COMMISSIONER: Well, Mr.  
12 Veale may not have been here that day.

13 MR. GENEST: All right.

14 A We retained -- I'm having  
15 trouble with the proper names -- Renewable Resources  
16 with respect to mammals, and Aquatic Environments  
17 with respect to fish. Then we also retained Dr. Ban-  
18 field, who was not in any specific area. He was  
19 kind of an overall consultant.

20 MR. VEALE: Maybe this matter  
21 has been covered when I have been absent, but one thing  
22 I have been concerned about is will your consultants  
23 in that meeting of April of '73, are they going to be  
24 called in the further phases? Maybe Mr. Genest can  
25 answer that.

26 MR. GENEST: I think so, they  
27 are all going to be called, sir. Well, at least not  
28 every one, but at least a representative of each  
29 group, and Dr. Banfield will be called, and the mammals  
30 men and the fish men and the --



Dau, O'Rourke, Williams  
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1  
2  
3 the vege-  
4 tation men.

5 MR. VEALE: Could I just have  
6 precisely who it will be then for each particular  
7 category?

8 MR. GENEST: I think we'll  
9 have to give you the names. We haven't made up the  
10 panels of evidence, but they will be made up of  
11 representatives of all of those people who participated.  
12 You appreciate that some of the jobs were done by large  
13 teams of people, but the man who was responsible for  
14 the assembly of the work and stands behind the opinions  
15 expressed is going to be here.

16 MR. VEALE: Very well. Just  
17 specifically then if we talk about mammals, will it  
18 be -- I understand there was a Mr. Kaliff and there  
19 was a Mr. Jakinchuk who seemed to speak a great deal  
20 about mammals. Now, will Mr. Jakinchuk be appearing on  
21 the environmental panel with respect to mamals?

22 MR. GENEST: I don't feel that  
23 that's a proper question at this stage. We have -- your  
24 rulings say that we are to give notice two weeks in  
25 advance of who we're going to call and what they're  
26 going to say, and I haven't considered that in detail  
27 and I don't wish to pin myself down at this stage. But  
28 we are bound to be calling in accordance with your  
29 rulings the people who did the work.

30 MR. VEALE: Mr. Commissioner,  
the difficulty that I have with this area is that those





Dau, O'Rourke, Williams  
Cross-Exam by Veale

1 April 13th meetings seem to be the major time period  
2 in which the input from people, resource people and  
3 environmental resource people was given, and ultimately  
4 determined the construction plan before us. Now it's  
5 extremely important for us to know that we're going  
6 to be dealing with the same people when we come to  
7 another panel, and I chose Mr. Jakinchuk's name because  
8 I didn't think there was going to be any doubt about  
9 that particular name.

10 THE COMMISSIONER: Well,<sup>do</sup> the  
11 names of Mr. Jakinchuk and Mr. Kaliff appear in the  
12 Minutes of the meeting of April 13th?

13 MR. VEALE: Yes, they do.

14 THE COMMISSIONER: Well, it  
15 seems to me that Mr. Genest is right in saying that  
16 he's not obliged to start making promises about calling  
17 people whose names are offered here today. But I  
18 suggest that if you want these people on the panel,  
19 that deals with the particular subject, you should  
20 so advise Mr. Genest and then if he doesn't include  
21 that person on the panel, you can apply to the Inquiry  
22 for a subpoena to have the witness called for cross-  
23 examination. I don't really see any difficulty here.

24 MR. GOUDGE: If I may be  
25 of some assistance, Mr. Kaliff will be here the first  
26 week in June in connection with the Environmental  
27 Protection Board. He was, I think, at that stage was with  
28 their organization rather than in Northern Engineering.  
29 Mr. Templeton has advised me that he will be here in the  
30 first week in June and I think would be available, perhaps, then or  
at some later date to be cross examined by my friend.



Dau, O'Rourke, Williams  
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1 MR. VEALE: Well, Mr. Commis-  
2 sioner, I'm certainly prepared to follow the procedure  
3 that you've outlined, and I could do that outside this  
4 hearing then.

5 THE COMMISSIONER: Yes,  
6 certainly.

7 MR. VEALE: Advising Mr.  
8 Genest by letter.

9 Q Mr. Dau, you mentioned  
10 in your examination in chief that you will be employing  
11 environmental inspectors and socio-economic monitors.  
12 That would be in addition to your engineering  
13 inspectors. Are you familiar with this area? It's on  
14 page 6 of your written statement. It's sub-section 5.

15 WITNESS DAU:

16 A Yes sir.

17 Q I'd like to just have  
18 a little more information about their role and so on.  
19 What do you conceive an environmental inspector to be?

20 A This question should be  
21 more properly answered by a policy witness of the  
22 applicant. He probably would not be an employee of  
23 Northern Engineering. In an attempt to respond to  
24 your question, in the environmental area in my view,  
25 would be generally relating to matters of wildlife,  
26 mammals, birds and fish and so on.

26 MR. GENEST: It seems to me,  
27 Mr. Commissioner, that these questions would arise  
28 more properly in environmental socio-economic phases  
29 and probably most importantly in the sort of after  
30 phase dealing with regulation that we are apparently are



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1 all agreed we should have.

2 MR. VEALE: Well, Mr. Commis-  
3 sioner, I would like to deal with this area now that's  
4 been raised in evidence by Mr. Genest, and it seems to  
5 me it's a very important area because possibly the  
6 inter-action of environmental and socio-economic in-  
7 spectors with engineering inspectors is a crucial  
8 area, and I'm not quite sure if these gentlemen will  
9 be back to speak about this specific area, because  
10 I think the engineering point of view is extremely  
11 important.

12 THE COMMISSIONER: Well, I  
13 think that the matter having been raised in chief,  
14 you're entitled to pursue it in cross-examination at  
15 least to elicit what you can from these gentlemen, what  
16 they intended when they said that.

17 MR. VEALE: Thank you, Mr.  
18 Commissioner.

19 THE COMMISSIONER: What they  
20 understood would be done.

21 MR. VEALE: Q Well, Mr. Dau,  
22 what do you understand to be the relationship be-  
23 tween an environmental inspector and an engineering  
24 inspector during the construction of the pipeline?  
25 Who will report to whom?

26 A They would both report  
27 to Canadian Arctic Gas Pipeline personnel at that time.  
28 They would each have their own areas of expertise, in  
29 other words I can't quite visualize the environmental  
30 inspector reporting to an engineering inspector, or



Dau, O'Rourke, Williams  
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1 vice versa.

2 Q Well, just from your  
3 own experience on constructing pipelines, would the  
4 project manager be the person that would have these  
5 two people report to him? We're dealing now say with  
6 the construction spread. I am assuming that you would  
7 have an inspector of each kind for each construction  
8 spread, is that correct?

9 A I'm sorry, once again,  
10 please?

11 Q Let's take one single  
12 construction spread.

13 A Yes.

14 Q Will you have an environ-  
15 mental inspector relating to that spread, and also an  
16 engineering inspector for that spread, and if it's close  
17 to a community would you also have a socio-economic  
18 monitor?

19 A I would believe so, sir,  
20 yes.

21 Q Now, they would presumably  
22 have some method of daily reporting to determine how  
23 the construction was proceeding. What is your under-  
24 standing, who would they report to on that con-  
25 struction spread?

26 A They would report, in  
27 my view, to personnel of Canadian Arctic Gas Pipeline  
28 at that time, rather than a study group it would be  
29 a Pipeline Company at that time. They would be report-  
30 ing to the owner of the pipeline.





Dau, O'RourkeWilliams  
Cross-Exam by Veale

1  
2 Q You mentioned further  
3 down on that page that they would have day to day field  
4 control. What do you mean by that or what do you under-  
5 stand that to mean?

6 A Which section is that,  
7  
8  
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29  
30  
sir?



1 Q It is on page 6, at the  
2 bottom of the page.

3 A My understanding of that  
4 would be that they would have sufficient authority  
5 to cause work to stop in the event it was not in  
6 accordance with, say, specifications or plans and so  
7 on that had been outlined prior to the start of work.

8 Q In other words, I can take  
9 it then that your understanding of that is that on  
10 each construction spread, either one of these parti-  
11 cular inspectors, whether it's a socio-economic  
12 inspector or an environmental inspector, would be  
13 able to say "stop construction." Is that correct?

14 A Yes, within his own terms,  
15 his own expertise. Obviously, the socio-economic  
16 inspector is not going to shut down the spread because  
17 of some bad welding, you know. In their own field,  
18 certainly they would have to have that type of  
19 authority.

20 Now, whether -- and the other  
21 point is that with respect to engineering and construct-  
22 ion inspection, there is obviously more than one  
23 person. There's a significant staff involved, and  
24 there is a method of reporting within the organization.

25 Q Well, what I'm concerned  
26 about is if we have an environmental inspector or a  
27 socio-economic monitor, who feel that under their  
28 particular expertise the ditching and stringing of  
29 the pipeline should stop. Now we also have an engin-  
30 eering inspector on the site and he's saying things



1 are going really well. As a matter of fact, let's  
2 keep it going really well, because then we will be  
3 able to stay within our time frame that we've  
4 established in the overall construction plan.

5 Now what happens when that  
6 kind of conflict arises?

7 A They would both report to  
8 the owner of the pipeline at that time, who would  
9 obviously have to make a decision.

10 Q Is the owner -- is he  
11 available at the spread camp, or is he somewhere else  
12 on the line? Have you considered this aspect?

13 A Certainly the owner will  
14 be well represented in each of the major construction  
15 areas. He will have his staff there, as will the  
16 various inspection staffs in engineering and so  
17 on.

18 Q In other words, the final  
19 decision with respect to the stoppage of work on a  
20 particular construction spread, remains in that  
21 construction spread, and they don't have to, you know,  
22 phone Calgary or phone Edmonton. Is that right? Is  
23 that what you're saying?

24 A My understanding is that  
25 that authority rests within the spread itself, within  
26 the overall spread, including owner, contractor,  
27 engineer, et cetera, et cetera. The owner has the  
28 final authority.

29 Q And who --

30 THE COMMISSIONER: Excuse me,



1 Mr. Dau and Mr. Veale. On the next page you say,  
2 "The applicant will retain authority to order a stop-  
3 page of work", which is consistent with what you are  
4 saying now, but what I am interested in and what I  
5 think Mr. Veale is getting at, is who is there on the  
6 spot representing the applicant with authority to do  
7 precisely that, stop the work?

8 A I don't have-- sorry, sir.

9 Q Well you may have answered  
10 this yesterday, but is there a contractor who is in  
11 charge of this project who would be the man in charge  
12 of the spread, but yet without authority to order a  
13 stoppage of work, since that authority resides in  
14 Arctic Gas?

15 Are you in a position to answer  
16 that?

17 A I can try, sir. It's  
18 obviously a policy question from Canadian Arctic Gas,  
19 but my understanding in discussion with Arctic Gas  
20 is that Arctic Gas will have resident at any major  
21 construction activity, and we could call him a project  
22 manager for Arctic Gas, who has the final authority  
23 to shut down and do all these things.

24 There will be a construction  
25 contractor, a construction contractor is obviously  
26 charged with the responsibility of completing the  
27 work in accordance with specifications, designs and  
28 so on, in a very efficient manner.

29 There's an engineering contract-  
30 or in that sense who does the surveys, the soil





1 drillings and inspects the work that's being done by  
2 contractors for conformance to design and specificat-  
3 ions.

4 There is either the owner's  
5 own forces or/<sup>a</sup> construction manager retained by the  
6 owner who is responsible for the -- responsible for  
7 inspecting the efficiency and the method of doing  
8 the work, rather than the detailed technical things.  
9 This organization would be inspecting to make sure  
10 that the contractor was efficient.

11 In addition to that, as I  
12 understand it, the owner will employ environmental  
13 inspectors. Now, those inspectors will report directly  
14 to the owner, the owner's project manager at that  
15 particular site, and I'm quite sure that there will  
16 be other inspectors from government agencies and so  
17 on, who obviously will have authority to do certain  
18 things, shut down work in the event, you know, what  
19 that is today -- today I don't know what that is.

20 I can assure you there will be  
21 plenty of inspectors on this project.

22 Q I would agree with that.  
23 You mentioned the project manager. Now you envisage  
24 then that each construction spread will have a  
25 project manager?

26 A I gave him that title, sir,  
27 just for convenience. It's the owner's represent-  
28 ative.

29 Q Right.

30 A I don't know what they are



1 going to call him.

2 Q Fair enough. But as I  
3 understand it, Mr. Williams is a project manager for  
4 the overall construction plan. Is that correct, Mr.  
5 Williams?

6 WITNESS WILLIAMS:

7 A I participated in the  
8 formulating of the construction plan. My present  
9 title with Northern Engineering is Director of Field  
10 Services. I understand that some of the drawings  
11 there might say project manager. I was certainly  
12 heavily involved in route location and production of  
13 maps and in the formulating of the construction plan.  
14 But the title on the map might be a misnomer, I  
15 don't think it's too material though.

16 Q I see, but would it not  
17 be likely that you would become overall project manager  
18 on this construction project, bearing in mind that  
19 you have spent three years on it and you know all the  
20 ins and outs of the project?

21 A No sir, I work for Northern  
22 Engineering. I would probably be involved with  
23 Northern Engineering in the field services aspect, but  
24 not a staff member of Canadian Arctic Gas.

25 Q Is it possible that Canadian  
26 Arctic Gas would hire or make a contract with N.E.S.  
27 to supervise overall project management?

28 MR. GENEST: Mr. Commissioner,  
29 it seems to me that's a question to be addressed to  
30 the Canadian Arctic Gas people when they come here,



1 rather than put these people on that kind of a spot.

2 THE COMMISSIONER: I think you  
3 are right.

4 MR. VEALE: Is that a Mr. Horte  
5 question or what?

6 MR. GENEST: I think that's a  
7 Mr. Horte question, sure.

8 THE COMMISSIONER: I think what  
9 Mr. Veale's gotten into is something that should be  
10 explored with Mr. Horte, and you might have him in his  
11 evidence-in-chief outline this relationship between  
12 the owner at each spread, the contractor, the environ-  
13 mental inspector, the socio-economic monitor and the  
14 engineering inspector, and -- so that Arctic Gas  
15 can give/<sup>us</sup>the picture as they see it. It isn't entirely  
16 fair to Mr. Dau to ask him to outline it for you.

17 MR. GENEST: I had intended to  
18 do that, I recognize that as an important aspect, sir,  
19 and evidence will be led on that topic.

20 WITNESS DAU:

21 A I thought, Mr. Genest,  
22 that I might have the chance to negotiate a pretty  
23 good contract here.

24 MR. GENEST: Hire Mr. Veale.

25 THE COMMISSIONER: By the way,  
26 if --

27 MR. VEALE: I defer to you, Mr.  
28 Genest.

29 THE COMMISSIONER: -- a super-  
30 vising contractor has been appointed, or is expected



1 to be appointed, I think that Mr. Horte might let us  
2 know that and let us know which firm it is or is  
3 likely to be.

4 MR. GENEST: Yes, sir.

5 MR. VEALE:

6 Q Mr. Dau, the Environmental  
7 Protection Board has made recommendations with respect  
8 to the supervision of construction activities on the  
9 coastal slope of the Yukon. Now, have you considered  
10 all these recommendations in their detail?

11 A No, I have not.

12 Q That has not gone in then  
13 to your formulation of this construction plan at all?

14 A No, sir.  
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Dau, O'Rourke, Williams  
Cross-Exam by Veale

1 Q Well, maybe you can  
2 tell me what has from an environmental point of view,  
3 like  
4 / you've suggested that the construction plan -- your  
5 initial statement was that that was one of the con-  
6 siderations. Now, if you didn't look at the E.P.B.  
7 recommendations, what did you look at?

8 A Well, those E.P.B. re-  
9 commendations, as I understand it, sir, came out  
10 sometime after the plan was finalized. What we have  
11 looked at is the advice from our consultants in the  
12 environmental area.

13 Q O.K., let's take a  
14 specific example. Construction spread camp C at  
15 Komakuk Beach is likely to have some impact on the  
16 caribou calving ground. Is that correct, you've been  
17 advised of that?

18 A Yes, I recall conver-  
19 sations about that, yes sir.

20 Q What did your consultants  
21 advise you to do to minimize that disruption?

22 A I can't recall specific  
23 recommendations for that area.

24 WITNESS WILLIAMS: With  
25 respect to pipeline construction in that area, I feel  
26 fairly certain we were asked to have construction  
27 completed before the migration takes place that  
28 precedes the calving, and certainly our schedule as  
29 shown is intended to -- the pipeline work will be  
30 finished before that migration is very far advanced.  
It's understood that there will be -- could be a few



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1 caribou around, some apparently stay there all winter,  
2 a very few. But then I recall other discussions  
3 particularly with respect to the interior route where  
4 it does cross the migration routes of the caribou,  
5 that we agreed that construction would have to cease  
6 if the migration and the pipeline construction were  
7 coincidental, particularly late in the winter season  
8 or very early in the spring.

9 Q Well, Mr. Williams, let's  
10 take an example then if we consider the interior  
11 route, and you have a large herd, you know herds/<sup>range</sup>from  
12 small sizes to up to 60,000, when they're in  
13 their migrating process. Now what happens if a herd  
14 of that magnitude of 60,000 came across or you were  
15 advised was coming across in front of your ditching  
16 and stringing? Now it might take a week for that herd  
17 to pass. Now is your position now that you are going  
18 to have a work stoppage for that complete week?

19 A The first attempt would  
20 be to try to move the spread ahead and leave a gap  
21 there so it can continue on in some area that wouldn't  
22 affect the migration. If that could not be achieved  
23 for some reason, then the alternative is to shut down.  
24 But generally speaking, this is late in the season and  
25 we hope to be out of there before that occurs.

26 Q Have you taken into  
27 consideration in your non-productive days on each  
28 spread that kind of consideration?

29 WITNESS DAU: I don't think  
30 so, sir. That was not specifically one of the items.



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1 Q Now I --

2 A It would have to be  
3 in that group obviously, but what I'm saying is that  
4 we didn't calculate that we would be shut down for  
5 seven days in this area because of this, no, we didn't  
6 do that.

7 Q All right. Now you've  
8 mentioned, Mr. Williams, one method of dealing with such  
9 a migration and you suggested that you would actually  
10 advance your work and start ditching ten miles down the  
11 line and stop your work at a particular place and  
12 leave a gap. Now, what would happen in the situation  
13 where the herd was in fact coming down and it was  
14 coming right along by your line, and you had a certain  
15 amount of ditch open, a certain amount of pipe  
16 strung. What have you discussed with your consultants  
17 relating to that situation?

18 MR. MARSHALL: Are you  
19 are going  
20 asking what the caribou/ to do, what Mr. Dau is going  
21 to do, what Arctic Gas is going to do? Or what the  
government inspectors are going to do?

22 MR. VEALE: I don't think that Mr.  
23 Dau can speak for the caribou, but he can certainly  
24 speak for himself.

25 WITNESS DAU: The question, sir,  
the caribou migrating  
26 relates to /directly down the right-of-way?

27 Q I'm just postulating a  
28 situation in which a caribou herd is going to come  
29 into immediate contact with your ditching and stringing.  
30 Now what will the reaction be of your construction  
crew? Have you considered what the reaction would be?



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1 What are they going to do?

2 A My understanding is that  
3 it's possible to determine when caribou are migrating  
4 by aerial surveys, and we would have considerable notice  
5 before they arrived there, and as Mr. Williams said,  
6 there is an opportunity in the event that the migrating  
7 herd is going to conflict with the construction activity  
8 to get the expert advice that that was going to happen.  
9 We have the possibility and undoubtedly would re-arrange  
10 our construction plan at that particular location.  
11 One way of doing it is to move ahead to a different  
12 location, say ten miles down the route and maybe work  
13 in the other direction or leave a gap and come back to  
14 it later. If we're in a very fortunate position in  
15 that particular year that we were working there, had  
16 not used up all of our non-productive days, maybe we  
17 could afford to shut down for a couple of days while  
18 they went by. All of these possibilities are available  
19 to us.

20 Q I see. What about the  
21 ditching and stringing that I have mentioned, where  
22 you in fact may have a certain length of pipe strung  
23 out and a certain amount of ditching done? Now, are  
24 you going to cover up the ditch and deflect the pipe  
25 in the direction that the caribou movement is coming?

26 A With respect to the  
27 ditch, as I said, we would have sufficient notice  
28 as I understand it, to backfill the ditch so there  
29 would not be open ditch; and yes, with respect to the  
30 pipe that is strung, there would be gaps in the pipe





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1 to allow them to cross the right-of-way. Now whether  
2 that's moving every joint of pipe at right angles to  
3 the right-of-way or moving a series once in a while,  
4 I have no idea what would be the best way of doing that.  
5 But that can easily be done, yes.

6 Q What about the activities  
7 of helicopters and your aircraft at this time?  
8 What consideration have you given to their effect on  
9 the movements of caribou?

10 A We've had some advice  
11 from our consultants as to minimum flight levels and  
12 flight paths and so on, and they, I think, should  
13 speak to that when they are on the panel here.  
14 I'm not familiar with the exact flight paths or alti-  
15 tudes that they are recommending.

16 Q I see. So you haven't  
17 adopted any of these things in your construction plan  
18 at this time?

19 A Yes, they're in the  
20 construction plan. They're essentially, they are  
21 very simple to do. You know, we haven't laid out a  
22 detailed plan that in the last week of March you have  
23 to fly at 4,300 feet, that hasn't been done, no, but  
24 they are not difficult things to do. I'm not saying  
25 that there won't be aircraft traffic. There obviously  
26 will be, but it's something that is controllable.  
27 And you can control it to cause the minimum disturbance,  
28 whatever that may be.

29 Q So your position is  
30 then that your environmental people are going to give



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1 us these details at a further stage of this Inquiry,  
2 is that correct?

3 MR. MARSHALL: He didn't say  
4 that, Mr. Veale.

5 MR. VEALE: Well, let him  
6 answer and he'll tell me whether he said it or not.

7 THE COMMISSIONER: I s that  
8 your position or is it not?

9 A My understanding is that  
10 they have made some recommendations and I understood  
11 the question, you know, what were the recommendations?  
12 What are you going to do? I'm not familiar with all  
13 the details. I can certainly try and find it for you.  
14 I seem to remember with respect to the Arctic coast,  
15 in summer operations they were recommending flight  
16 paths some distance over the sea, some distance from  
17 land. I believe the number is 3,000 feet above the  
18 ground for disturbance to Dall sheep. I think the number  
19 is 2,000 feet for / <sup>disturbance</sup> -- I'm talking about fixed  
20 wing aircraft with caribou; and as I recall it's  
21 greater with helicopters, particularly with respect  
22 to the sheep. But they have made recommendations  
23 this regard.

24 Q Well, is it possible for  
25 you to provide us with that information this afternoon,  
26 or is that something you would like a longer time to  
27 provide?

28 A I'm sure it's been  
29 filed. I'll try and find out which document it's in,  
30 sir. I think it's in the biological report, sir. Yes,  
I'll attempt to find out where that is.



1 MR. MARSHALL: Mr. Commissioner,  
2 this is perhaps a subject more appropriately dealt  
3 with by the Environmental consultants when they appear  
4 in phase 3, to give their recommendations as to  
5 limitations on aircraft movements and so on.

6 I wonder if we might be able to  
7 deal with it then?

8 MR. VEALE: Mr. Commissioner,  
9 my feeling is that, to use a common word, there's an  
10 interface between the engineers and the environment-  
11 alists, and I am trying to determine what the engineers'  
12 position is on the environmental advice.

13 Now, I won't be able to do that  
14 in the environmental section, unless of course you're  
15 telling me now that you are going to have your engineers  
16 on the environmental panel. I would be interested in  
17 hearing about that.

18 MR. MARSHALL: Stick  
19 around.

20 MR. COMMISSIONER: I think Mr.  
21 Marshall's got a point, Mr. Veale. What - where does  
22 it get us to have Mr. Dau groping for these answers  
23 that presumably the panel of environmentalists from  
24 Arctic Gas is better equipped to provide us with?  
25 I'm willing to bend the rules somewhat for you,  
26 because you can't be here all the time and I don't  
27 want you to make unnecessary trips from Whitehorse  
28 to Yellowknife, just to ask a couple of questions.

29 So if you want to proceed along  
30 this line, I'm willing to let you do so, because it



1 may save you a trip later on, but Mr. Marshall's point  
2 is a forceful one.

3 MR. MARSHALL: Mr. Commissioner,  
4 we would like to accommodate Mr. Veale and I'll  
5 endeavour over the noon hour to get a handle on this  
6 question and see if we can direct him to the refer-  
7 ences in the biological report series and so on,  
8 where he could get this information.

9 Perhaps we can get much of the  
10 information he's interested in that way.

11 MR. VEALE: Just maybe we can  
12 determine the validity of this line of questioning,  
13 but it seems to me it's one thing for an environment-  
14 alist to say you have to maintain 2,000 feet on all  
15 flights over the area, and it's another thing for an  
16 engineer to determine how many flights he has to make  
17 and whether or not it's feasible.

18 Now, someone has to say --

19 THE COMMISSIONER: When you put  
20 it that way, I think you're entitled to pursue that.  
21 I think we would all agree on that.

22 MR. VEALE: Well that's --

23 THE COMMISSIONER: Well go  
24 ahead.

25 MR. VEALE: -- the line of  
26 questioning that --

27 Q Well Mr. Dau, now you have  
28 stated certain --

29 THE COMMISSIONER: Now I under-  
30 stand what an interface is.





1 MR. VEALE:

2 Q Mr. Dau, you've stated  
3 certain flight regulations which would deal with  
4 line of flight and also the altitude of flight, and  
5 you've stated certain figures. Now, do you adopt  
6 these as being possible to comply with and meet all  
7 your construction timing requirements?

8 A First sir, I'm quoting  
9 from memory, I'm not sure the numbers are correct,  
10 but there were some recommendations which gave some  
11 minimums and recommendations with respect to flight  
12 paths.

13 When I read them, I didn't see  
14 any great amount of difficulty in complying with  
15 those regulations or recommendations, rather, except  
16 that there is a requirement/<sup>that</sup>for instance aircraft  
17 will have to land at compressor stations. And  
18 obviously, you know, you're going to --

19 Q Yeah, you have to get  
20 down --

21 A -- have to get down below  
22 3,000 feet to land at a compressor station, and in  
23 construction activities there will be times when it's  
24 necessary to use a helicopter and to fly in some  
25 locations at low altitudes. The point I'm trying to  
26 make is that it's not difficult to comply with those  
27 recommendations, recognizing that at some times and  
28 at some locations you just physically can't do it,  
29 because you have to land at certain locations, but  
30 they're not, when I read them they weren't, you know,



1 very difficult to comply with. I thought them quite  
2 reasonable.

3 Q Well that's good to hear  
4 then, Mr. Dau, but what I would be interested then if  
5 you could arrange it with Mr. Marshall, is that you  
6 find that type of regulation relating to over flights  
7 and we could get it in the record as to the specific  
8 heights and the lanes of flight, and then you could  
9 say from an engineering viewpoint that that was  
10 satisfactory. That's what I'm interested in.

11 Now, would you be able to do  
12 that this afternoon, or is that something you would  
13 like to --

14 MR. MARSHALL: We'll attempt to  
15 get something over the noon hour. I doubt that we'll  
16 be able to have everything put together, but we'll do  
17 our best, Mr. Veale.

18 MR. VEALE: Thank you.

19 MR. MARSHALL: Incidentally,  
20 we are talking about recommendations, not regulations.

21 MR. VEALE: Yes, we can deal  
22 with recommendations.

23 Q this is a question for  
24 either Mr. Dau or Mr. Williams, and it relates to  
25 recommendations, rather than regulations. Have you  
26 considered any recommendations relating to placing  
27 controls on the physical movement of construction  
28 workers at construction spreads?

29 A I don't quite understand,  
30 sir.



1 Q Well I will give you an  
2 example then. If your construction spread is close  
3 to a community, will you place any constraints on  
4 construction workers in their visits to that commu-  
5 nity?

6 A My understanding is that  
7 the applicant has said that that will be the case,  
8 yes. I would agree with that, yes.

9 Q And are you aware of what  
10 the recommendations are? Have you discussed these  
11 with your consultants?

12 MR. MARSHALL: This really gets  
13 into a question of the applicant's policies for control  
14 over the camps, and the personnel in attendance at the  
15 camps. I think, Mr. Commissioner, it would be more  
16 appropriate to be dealt with by a policy witness for  
17 the applicant.

18 THE COMMISSIONER: Well, I would  
19 agree, Mr. Marshall, if Mr. Dau is unable to disclose  
20 the policy, but I think you dealt with this subject in  
21 your evidence yesterday, Mr. Dau. If there is anything  
22 you can add, please do.

23 WITNESS DAU:

24 A I don't think I can add  
25 anything to it.

26 MR. VEALE:

27 Q What would your understand-  
28 ings be of the restrictions that could be placed upon  
29 men in construction camps?

30 A Well the restrictions that



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1 could be placed upon them would be that there would  
2 be no vehicles available for them to visit the commu-  
3 nities. I would -- if somebody wanted to walk, I  
4 don't know how you would stop them, but most  
5 instances there's a significant distance in the winter  
6 and I suspect they would not do it.

7 Q Well then let's --

8 A Also, we want to make sure  
9 that they work long hours and they don't want to go  
10 out and visit people.

11 Q I don't know if that's  
12 actually the answer to keeping them from the communi-  
13 ties. If vehicles from the construction camp were  
14 as a matter of course going into communities, what's  
15 your reaction to that problem?

16 A Well --

17 MR. MARSHALL: What problem?  
18 It's just not clear to me what --

19 MR. VEALE: The problem? The  
20 problem of controlling the men in construction camps  
21 with respect to visits to communities.

22 THE COMMISSIONER: Well this  
23 would be -- Mr. Dau has said that they are not going  
24 to make vehicles available to them. If they do  
25 manage to get to Old Crow or Fort McPherson or Fort  
26 Good Hope or Yellowknife, you don't have M.P.'s that  
27 go around looking for them or anything like that,  
28 do you, Mr. Dau?

29 A I would hope not, sir.

30 I might add, sir, this was





1 discussed in some length in response to the questions  
2 of the pipeline Assessment Group and it's question  
3 11.

4 MR. VEALE:

5 Q Have you read that response,  
6 Mr. Dau?

7 A Yes, I have read it, yes.

8 Q And basically, as I under-  
9 stand it, there are two factors mentioned in that  
10 response and it states that number 1,

11 "Facilities will be very  
12 good at the construction camp spreads and  
13 therefore the men will not likely want to  
14 leave them".

15 A Yes.

16 Q And number 2, it suggests  
17 that,

18 "Weather conditions will be  
19 such in the north that men will be unable  
20 to leave them".

21 Now, it doesn't seem to me that  
22 it goes any further than that. Am I right or wrong  
23 on my assessment of that?

24 A Essentially that's right.  
25 The only other point I was trying to make was that  
26 there will not be vehicles available for them to  
27 travel. But I agree with what's said there.

28 Q Well, from your own exper-  
29 ience in this field, is that type of recommendation  
30 sufficient, or are there further policies and things



1 that could be suggested to keep men in construction  
2 camps?

3 A For this project, I think  
4 these are sufficient, since essentially all of the  
5 camps are located some distance away from communities.  
6 There are cases, obviously, where that is not -- you  
7 know, the ones listed here for instance, the closest  
8 is about eight miles.



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1 Q Right.

2 A There are some smaller  
3 camps that are located right at communities, as  
4 I recall.

5 Q Is it fair to say then  
6 that assuming the implementation of those recommenda-  
7 tions by the applicant, that you can't foresee any  
8 difficulties then of inter-action between construction  
9 camps and communities?

10 THE COMMISSIONER: I think  
11 that's -- suppose Mr. Dau can, suppose he can't. Where  
12 does that get us? You're entitled to argue in due  
13 course that the measures proposed are not sufficient.  
14 It may be that somebody else will come in here and  
15 say that there ought not to be any restrictions on  
16 such inter-action. Then we'll have to deal with it.  
17 But there isn't much point in asking Mr. Dau his  
18 opinion. He's not here as a socio-economic impact  
19 witness. He's here as an engineer. I think we've  
20 gone about as far as we can go with Mr. Dau on that  
21 subject.

22 MR. VEALE: Thank you, Mr.  
23 Commissioner.

24 Q Mr. Williams, in your  
25 presentation on snow roads, with respect to the test  
26 site in Inuvik, I'm wondering just how far you've gone  
27 in your tests. You've mentioned two methods of  
28 obtaining snow when there is a certain lack of it  
29 which might prevent your construction activity from  
30 proceeding, and one of them is you have suggested that you



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1 can take snow from lakes, harvest snow in other words,  
2 and spread it. The other suggestion is that you can  
3 make snow fences which catch the snow and harvest it  
4 from there; and thirdly you've also suggested that  
5 you can use water and snow spraying machines. Now have  
6 you considered the application of that particular process  
7 to the coastal route in the Yukon Territory where you  
8 might encounter a shortage of snow? You might also  
9 encounter <sup>a</sup>/shortage of water to use and you might also  
10 encounter the situation where your environmental monitors  
11 tell you that construction of a fence will interfere  
12 with caribou migration. Now have you dealt with those  
13 areas yet in that particular study?

14 WITNESS WILLIAMS: I'm just  
15 not sure what you mean by "dealt with them". We have  
16 formulated a plan and we have -- these plans, we have  
17 written about it in the response to the Pipeline  
18 Assessment Group's questions. We have discussed  
19 them with our environmentalists, certainly this ques-  
20 tion of snow fences and caribou has been discussed,  
21 they don't have to be continuous along the pipeline.  
22 They obviously would be oriented at right angles to  
23 the direction of the prevailing wind, but they do not  
24 have to be continuous. Gaps can be left and we would  
25 hope to rely fairly heavily on the Yukon slope to the  
26 use of snow fences. It's certainly more economic than  
27 hauling snow or water from lakes. In that particular  
28 location it is the preferred method, yes.

29 Q The fence method is  
30 preferred to the other two methods? Is that correct, do





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1 I understand you correctly?

2 A On the Yukon coast,  
3 as you referred to, sir, yes.

4 Q You actually wouldn't  
5 have tested that particular method in the field, is  
6 that fair to say?

7 A No, there was a little  
8 bit of snow fencing work done in Alaska, in Prudhoe  
9 Bay, where the situation is similar and snow did  
10 accumulate at the fences installed there.

11 Q And it worked satisfac-  
12 torily, is that correct?

13 A The -- this wasn't in  
14 connection with a snow road test program, but it was a  
15 test of snow fences per se to see how they would work.

16 Q Do you have any con-  
17 tingency plan conceived for the situation that I  
18 postulated in my first question where in fact you may  
19 not have snow available, you may not have the water  
20 available, and let's say the snow fence doesn't work  
21 as well as you would expect it, what's the contingency  
22 plan to deal with that situation on the North Slope  
23 of the Yukon?

24 A Well, I don't think I  
25 can accept that there's no water available, sir. There  
26 are lakes and in the early part of the construction  
27 season, which is a critical time when we have a short-  
28 age of snow, there is water running in the rivers.  
29 They tend to freeze to the bottom as the winter  
30 progresses, but in the early part of the season there



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1 is water and the shallow lakes have not frozen to the  
2 bottom in the early part of the season. I'm convinced  
3 that there would be water available and it would be  
4 necessary to have the equipment there to utilize that  
5 water in the case that you cite, and manufacture snow.

6 Q So I take it then you  
7 haen't formulated a contingency plan to deal with the  
8 situation I postulated. You expect it to be there and  
9 that's all there is to it?

10 A In one of the other  
11 responses to the Pipeline Assessment Group, we did  
12 give some measures that could be taken in the event  
13 that the contractor fell behind schedule. Is that  
14 what you're referring to?

15 Q You'd hve to develop  
16 that a little further.

17 A This is in response to  
18 question No. 25, and there are about five items listed  
19 there . on page 25-3 and 25-4.

20 Mr. Williams,  
21 Q /Which one were you using  
22 in reference to the situation where you wouldn't have  
23 enough snow or water to deal with the problem?

24 A Well, as I said earlier  
25 I can't accept the complete unavailability of water.  
26 But it's conceivable that the contractor would fall  
27 -- for  
28 behind schedule for other/weather reasons, for instance,  
29 and as we suggest here, they can work longer hours,  
30 bring in additional people, work more than one shift,  
these measures to, contingency measures that can be  
taken to assure the completion of the work. It might



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1 be that the adjacent spread had better luck and he  
2 can do more than he was allotted. He can then, he's  
3 working towards the spread that's in trouble and he  
4 possibly can do more.

5 Q Did this question of  
6 snow roads and the availability of snow and water  
7 -- did you take that into consideration when you  
8 determined just your general construction progress and  
9 the time frame that you've established?

10 A Yes sir, I think we've  
11 mentioned that this has to go on early in the construc-  
12 tion season, early in the winter, to have at least some  
13 road and right-of-way ready when the construction crews  
14 are to start in accordance with the schedule that we've  
15 filed.

16 Q Basically you don't  
17 anticipate then any major construction holdups as a  
18 result of the difficulties in constructing snow roads?

19 A No, I think I mentioned  
20 yesterday that this is a risk we can't take, and the  
21 equipment is going to have to be in place in the  
22 event that it was a season of very light snowfall.  
23  
24  
25  
26  
27  
28  
29  
30



1 Q When you conducted the  
2 tests of the snow road in Inuvik, were you running  
3 machinery and equipment over that road which would  
4 accommodate this new type of ditcher you've been  
5 speaking of? Does that present any weight problem?

6 A No, the road that we con-  
7 structed at Sans Sault would certainly carry the  
8 weight of the ditching machine, and normally of course,  
9 it would be travelling under its own power along the  
10 right-of-way, but if it required truck movement, the  
11 road could handle it. It's a matter of how much  
12 rubber you put underneath it.

13 Q I was referring actually  
14 to the road at the Inuvik test site, rather than  
15 the Sans Sault test site. Does the same answer apply?

16 A Yes, sir.

17 MR. VEALE: Mr. Commissioner,  
18 would it be appropriate to adjourn and continue this  
19 afternoon?

20 THE COMMISSIONER: Yes.

21 Mr. Goudge, the evidence of this  
22 panel given in chief, I'm thinking essentially of the  
23 evidence that was given yesterday, it was evidence in  
24 chief, but I asked a great many questions. The evi-  
25 dence that was given relating to logistics, Mr.  
26 O'Rourke's evidence about the expansion of the fleet  
27 of barges and tugs which would be needed to transport  
28 pipe and other equipment down the Mackenzie, the  
29 evidence about the use of the Mackenzie Highway, the  
30 evidence about the extent of the equipment that would





1 be brought into the Mackenzie Valley to build the  
2 pipeline, Mr. Williams gave a great deal of evidence  
3 on that subject.

4 A lot of that evidence has a  
5 considerable bearing on phase 4, social and economic  
6 impact, and I would like you to get in touch with  
7 Mr. Sigler who is counsel for the Association of  
8 Municipalities, and draw to his attention the prepared  
9 evidence of Mr. Dau, and the transcript for yesterday,  
10 and I'm sure he's reading his transcripts as they  
11 come into his office daily, but you might just draw  
12 his attention to yesterday's transcript and tell him  
13 to review it, and tell him that he might wish to come  
14 here on May the 12th. We will be adjourning tomorrow  
15 until May the 12th, until Monday, May the 12th, and  
16 tell him he might wish to come here and ask some ques-  
17 tions, simply to flesh out the whole logistics and  
18 construction scene from the point of view of the  
19 Municipalities, so that they will be equipped to deal  
20 fully with the problems of social and economic impact  
21 when they arise in phase 4.

22 Would you also get in touch with  
23 the Chamber of Commerce, I think Mr. Sigler is the  
24 president of the Chamber of Commerce, at any rate,  
25 and just put that to them as well, because the Chamber  
26 of Commerce might want to come in here on May 12th  
27 and ask some questions through you about the construct-  
28 ion plan and the logistics, because they have a bear-  
29 ing on the expansion of Northern business, as the  
30 result of the pipeline.



1 I just don't want to see the  
2 Chamber of Commerce and the Association of Munici-  
3 palities overlooked in connection with this panel,  
4 because this panel has outlined evidence that has a  
5 very real bearing on phase 4, that is social and  
6 economic impact, so just bring those matters to the  
7 attention of Mr. -- well to the attention of the  
8 representatives of the Municipalities and the, the  
9 Association of Municipalities and the Chamber of  
10 Commerce.

11 MR. GOUDGE: Yes sir, I have  
12 made a note of that.

13 THE COMMISSIONER: So we will  
14 adjourn until 2:30 then.

15  
16 (PROCEEDINGS ADJOURNED)  
17  
18  
19  
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Dau, O'Rourke, Williams  
Cross-Exam by Veale

(PROCEEDINGS RESUMED PURSUANT TO ADJOURNMENT)

MR. MARSHALL: Mr. Commissioner, there are a couple of matters that we undertook to look into. We have some information available now but unfortunately we didn't have sufficient time to search, out all of the various undertakings.

One of the questions asked by my friend, Mr. Veale, related to the selection of the camp and stockpile site at Komakuk Beach, and Mr. Williams can speak to that matter.

WITNESS WILLIAMS: Yes sir, I'm looking at strip map drawing 3.a-02II-I002. The stockpile site at Komakuk Beach was certainly chosen because it is a disturbed area. This also applies to Shingle Point, and a couple of locations in Alaska. This was mainly done at the request of the ornithologist who are worried about disturbance to the migratory and shore birds during off-loading from barges in the summer season. Now the camp, the construction camp is also located at Komakuk. The alternative to Komakuk, of course, would be station CA-05. Now, you can see from the date shown here that the camp is moved in in the summer of '78 and has to be ready to go in early winter of '78. To get the camp from Komakuk Beach to CA-05, of course, would require the construction of a snow road, and in the early part of the season this would probably be fairly difficult to cross the Malcolm River. For that reason the camp is left at Komakuk Beach, it's only about three miles



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1 off the right-of-way and is located fairly centrally  
2 within that spread, and this is desirous to have the  
3 construction camp as close as possible to the centre  
4 of its section of length of line to be constructed  
5 because it cuts down the travel requirement.

6 MR. MARSHALL: There was  
7 another question raised by Mr. Veale with respect  
8 to the location of the campsite for construction spread  
9 A in the vicinity of Old Crow, and as I understood the  
10 question, the question of Mr. Veale, it was as to why  
11 that location was chosen rather than a location at  
12 compressor station 1-A-08. Mr. Williams can speak  
13 to that one as well, sir.

14 WITNESS WILLIAMS: Yes, I'm  
15 looking at strip map drawing 3-B-0211-1003, and I'm  
16 looking specifically at the camp location at Milepost  
17 335. There are a couple of reasons why that site was  
18 selected. Firstly, again it is more central in spread  
19 A than would be a campsite at compressor station 1-A-  
20 08. It is also on the line of the existing winter  
21 trail that will be used to haul in pipe from the --  
22 I'm sorry, that would be used if this alternative  
23 is selected to haul in pipe from the Dempster Highway.  
24 In addition, of course, it's located there to take  
25 advantage of the existing air strip at Old Crow, that  
26 is I think in excess of 6,000 feet, and will handle  
27 a Hercules.

28 MR. VEALE: Did you say in ex-  
29 cess of 5,000?

30 A I'm sorry, in excess of





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1  
2 5,000.

3 MR. VEALE: I'm wondering,  
4 would it be appropriate for me to address some questions  
5 on these?

6 MR. MARSHALL: Certainly.

7 MR. VEALE: Mr. Williams,  
8 on the Komakuk Beach spread camp, do you not run into  
9 the same difficulty of putting the camp somewhere along  
10 the beach as you would getting it inland? In other  
11 words, you just reduce your problems, I think, is  
12 that what you're saying essentially?

13 A No, the camp will have  
14 to be moved in the summer months by barge and it can't  
15 be moved any farther than that unless an all-weather  
16 road is constructed. There is gravel available at  
17 Komakuk and the camp could be set up there and ready  
18 to go for early winter operations.

19 Q I see, but would you  
20 not at that, even at the Komakuk Beach site, run into  
21 similar environmental problems as you would if you  
22 attempted to get into the compressor station?

23 A I'm not sure I follow  
24 that.

25 Q Well, you've indicated  
26 that you need a good snow road to get into the compres-  
27 sor station. Is that correct?

28 A To move the camp to the  
29 compressor station site to the east, yes, a snow road  
30 would be required.



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1 Q Right.

2 A The camp would have to be  
3 moved and set up and ready to go, and this would tend  
4 to delay things because, partly because of the Malcolm  
5 River.

6 Q I see. Now is it just  
7 the Malcolm River that's the problem, because I'm just  
8 suggesting that there may be some environmental  
9 problem at the beach itself which you would encounter  
10 in any event, in setting up your camp.

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1                   A     Well, there is the migra-  
2     tory bird problem in the fall, certainly. But there  
3     would be activity at the site there, but there has  
4     been activity at that location for a number of years  
5     now, and probably the incremental disturbance of the  
6     pipeline activity may not be too severe. Prob ably  
7     less severe than at the station site, --

8                   Q     I grant you that, yes.

9                   A     -- which is undisturbed.

10                  Q     Right. You're just using  
11     a trade-off there in that circumstance then. There  
12     will be disruption in both places and you're saying  
13     it will be minimized by having the camp set up at  
14     Komakuk Beach?

15                  A     I think the disturbance  
16     would be minimized and it fits our program better,  
17     because of the Malcolm River. It allows us an earlier  
18     start of construction.

19                  Q     Now with respect to spread  
20     camp A near Old Crow, you stated three factors: One,  
21     it's a central location; two, it has access to the  
22     existing Old Crow airstrip, and three, you stated it  
23     was on an existing winter trail. Now, starting with  
24     three, the existing winter trail, that trail wasn't  
25     there this year, was it, throughout the winter?  
26     You mean existing in the sense there's been one there  
27     in previous years when seismic exploration was done,  
28     is that what you mean?

29                  A     Yes, yes, that's what I  
30     meant. The trail has been cleared of brush; it has



1 been previously disturbed, and our policy is to use  
2 disturbed trails such as this wherever possible.  
3 Our policy in the development of this construction  
4 schedule for application.

5 Q Now, with respect to the  
6 use of the Old Crow air strip, have you made any  
7 or have you had any discussions or considered the  
8 allocation of use between say a snow road to the  
9 Dempster Highway, and the Old Crow airstrip? In other  
10 words, where are you going to bring all your supplies  
11 in? Are you going to allocate them between those  
12 access areas? You also have access, I presume, from  
13 the compressor station airstrip just down the line?

14 A Yes, certainly the bulk of  
15 the heavy material would come in on the winter road,  
16 the pipe, the construction equipment, the compressor  
17 station components would come in by road. We don't  
18 plan to use a Hercules, for instance, to any great  
19 extent, to transport that material in.

20 The spare parts, repair parts,  
21 groceries for the camp, bringing people in for the  
22 camp and out, that's the kind of activity that would  
23 go on at the airstrip.

24 Q Now with respect to the  
25 activity you've just mentioned at the airstrip, did  
26 you have any input from either Pat Carney or Frank  
27 Bashem with respect to the impact on the local people,  
28 or their reactions to that possible use?

29 A No, we had this construction  
30 plan available for that April and May meeting. We





1 -- you pointed out Miss Carney's comments with respect  
2 to Old Crow. I don't recall any other specific meet-  
3 ings or discussions with respect to Old Crow. Mind  
4 you, we do have some flexibility here too and if some-  
5 body could make a good case of why this should not be  
6 done, there are alternatives.

7 Q Now, there are a number of  
8 other factors relating to the Old Crow area, and it  
9 may be possible that your answer already deals with  
10 them, but I would suggest them to you and you can  
11 answer as to whether or not they were considered.

12 One would be the native fishery  
13 activity that takes place on the Old Crow River, south  
14 of your actual crossing. Now, did you consider that  
15 in relationship to the location of spread camp A?

16 A No, I don't think that was  
17 a consideration. This is a winter camp, and maybe some  
18 fishing goes on in the winter, but I'm not aware of it  
19 and it wasn't a consideration.

20 Q Did you consider the fact  
21 that the area is known as a sensitive caribou migrat-  
22 ion area, and that the people of Old Crow take in a  
23 great deal of caribou meat for their livelihood during  
24 the winter?

25 A Yes, that was certainly  
26 brought to our attention many times, and I think in  
27 part influenced the selection of the route which is  
28 south of the flats, but north of the village, again  
29 kind of between the two considerations.

30 We did get the word of concern



1 with respect to the flats themselves, and the muskrat  
2 trapping that goes on there, and we were -- it was  
3 requested that we try to stay as far away from the  
4 flats as possible.

5 It was also our desire to, where  
6 possible, stay well clear of the communities.

7 Q I see. But the road, of  
8 course, the snow road goes directly into Old Crow,  
9 so that you can off-load and on-load at the airstrip?

10 A Yes, sir.

11 Q Well okay now, this was  
12 brought to your attention. How did it affect your  
13 decision making with respect to location of the  
14 camp?



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1                   A     I think it     partly  
2     affected our line location there which, of course,  
3     it affects the camp location in that the camp is  
4     located adjacent to the pipeline route, and it's  
5     also six or eight miles from the village. I don't think  
6     I can expand too much on that.

7                   Q     Did you consider the  
8     impact of the snow road from the Dempster Highway with  
9     respect to its effect on caribou migration and also  
10    it's possible effect in terms of access to the community  
11    and the possibility that a permanent road would result?

12                  A     Certainly not the latter,  
13    no.    The concern for caribou migration was certainly  
14    pointed out to us on many occasions. Again this is a  
15    winter operation when the caribou, I think -- my  
16    understanding is they tend to stay in areas rather  
17    than move around to any great extent, except the late  
18    winter or early spring.

19                  Q     What about the fact that  
20    the temporary snow road runs very close to archeologi-  
21    cal sites, to existing sites, one is Klokut, that's  
22    K-L-O-K-U-T for the reporters; the other is the Old  
23    Chief site. Now was this brought to your attention?

24                  MR. MARSHALL: Excuse me, Mr.  
25    Veale, just for clarification. Are you talking about  
26    a winter trail or a snow road or what?

27                  MR. VEALE: Well, it's your  
28    terminology, it's a temporary snow road from the  
29    Dempster Highway to spread camp A.

30                  MR. MARSHALL: Well I think a



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1 snow road as I understand it is clearly defined term in  
2 the sense that the construction panel have been using  
3 it and other witnesses, and I just wondered if you're  
4 talking about that or we're talking about something  
5 else.

6 MR. VEALE: Well, maybe Mr.  
7 Williams can tell us whether it's a temporary snow  
8 road access route, which it appears to be as marked on  
9 the maps, or whether it's some other kind of road.

10 A We're speaking about the  
11 trail that's running south-east of the camp at Milepost  
12 335.

13 Q That's correct.

14 A That is a temporary  
15 winter snow road. I wouldn't expect that it would  
16 affect an archeology site, as we've discussed before  
17 it's a policy to keep the grading, the removal of  
18 -- or displacement of earth material down to the bare  
19 minimum and not at all, if possible. I don't recall  
20 archeological sites being specified in this particular  
21 area. If they were, I wouldn't see much of a problem  
22 to divert around the sites with a winter snow road.

23 Q With respect to the actual  
24 crossing of the river, do you have any information on  
25 whether or not that would be done by a blasting pro-  
26 cess or would it just be the normal ditching process  
27 to go across the Old Crow River?

28 A I would strongly suspect  
29 that some blasting would be required. It depends on  
30 the soil conditions, how much it thaws in the river





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1 during the summer and how much it freezes back before  
2 construction gets there. If it's a gravel, rock, frozen  
3 material there's a very good likelihood that blasting  
4 would be required.

5 Q Did you take into con-  
6 sideration any effects that the blasting would have  
7 on say nearby caribou, or any activities of the local  
8 people?

9 A Again, this is a winter  
10 operation. If need be, this crossing can be installed  
11 before or after the mainline construction goes through.  
12 If there are caribou in the area I would think it  
13 would be very easy to select a period during the winter  
14 season when there would be no caribou in the area, and  
15 it's certainly far enough from the village that I doubt  
16 if they would hear it.

17 MR. VEALE:  
18 Would you like to con-  
19 tinue, Mr. Marshall?

20 MR. MARSHALL: There was another  
21 point that we were able to check over the noon break  
22 and that related to the recommendations from consultants  
23 with respect to aircraft lines of flight and altitudes,  
24 and Mr. Carter can give some references pertaining to  
25 that.

26 MR. CARTER: I'm advised that  
27 the studies on the effect of aircraft are not in only  
28 one place but contained throughout the biological  
29 report series, and if you wish, Mr. Veale, I could  
30 refer you however to certain sections in various volumes  
to deal with this. Firstly, in Volume 5, entitled:



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"Disturbance Studies of Caribou and other Mammals  
in Yukon-Alaska, 1972."

Pages 181 to 215, and there's a list of recommendations  
on page 215. The first section deals with reactions of  
caribou to aircraft disturbance. The second section  
with reactions of moose and barren ground grizzly  
bear to aircraft disturbance. Then in Volume 14,  
the whole volume deals with disturbance and throughout  
there's reference to aircraft. So the whole volume  
should be looked at, it's entitled:

"Disturbance to Birds by Gas Compressor Noise  
Simulators, Aircraft and Human Activity in the  
Mackenzie Valley and North Slope, 1972."

Then in Volume 23 there are two chapters dealing with  
aircraft disturbance, Chapter 1, the title of that  
volume is:

"The reaction of some mammals to aircraft and  
compressor station noise disturbance."

Chapter 1 is the reaction of barren ground caribou  
to aircraft, and chapter 3 is the reaction of Dall sheep  
to an FH-100 helicopter. Then Volume 27 -- I'm sorry,  
Volume 29, entitled:

"Studies on Terrestrial Bird Populations,  
Moulting Sea Ducks and Bird Productivity in  
the Western Arctic, 1973."

chapter 2, and that's a study on the effects of air-  
craft disturbance on moulting sea ducks at Herschel  
Island, Yukon Territory, August 8, 1973. I'm also  
advised that there's a further volume, Volume 27,



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1 currently being printed and it should be available in  
2 a couple of weeks, and it deals with, I believe, snow  
3 geese disturbance and will contain sections on the  
4 effect of aircraft.

5 MR. VEALE:  
6 Thank you, Mr. Carter.

7 Q Are you familiar with  
8 those, Mr. Dau, with those volumes? Have you read them?

9 WITNESS DAU: I have not read  
10 all of them, sir. As I understand it, I've been  
11 generally told about the recommendations and I've read  
12 some of the recommendations. I'm sure I have not read  
13 all of the volumes, no.

14 Q But you're generally  
15 speaking you haven't run across any recommendations  
16 that you found that you couldn't comply with?

17 A No, my response would  
18 be as it was this morning, that we can -- I see no  
19 difficulty in following the recommendations as long  
20 as everyone understands that sometimes you have  
21 to land and you cannot comply with it. But I see no  
22 problem in following the recommendations with respect  
23 to moving from point A to point B, if you will. I'm  
24 not sure that the numbers I quoted are exactly the  
25 same as are in the volumes, those were by memory and  
26 as I understand it, the limits are less in the  
27 recommendations <sup>than</sup> some of the numbers I gave you this  
28 morning.

29 Q Mr. Dau, I would like  
30 to direct your attention to the interior route and  
the method of transporting material and equipment



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1 to the construction camp on the route. Mr. Williams  
2 has said that food supplies, people and so on would  
3 probably come in by aircraft to the Old Crow air  
4 strip, but what about the pipe itself? How is that going  
5 to be transported to the interior route?

6 A I think Mr. O'Rourke  
7 could probably respond to the overall movement of  
8 pipe. Obviously, it's a case of truck haul on winter  
9 roads, some on the Dempster Highway; by barge down  
10 the Mackenzie and then the Dempster Highway and then  
11 winter roads.





1 Q In other words then, just  
2 before we turn to Mr. O'Rourke, it's possible that  
3 some of that pipe to be used on the interior route,  
4 will be barged down and will come up from the Fort  
5 McPherson area? Is that contemplated, or have you  
6 actually decided that you are going to bring it all  
7 up through Whitehorse, for instance?

8 A Mr. O'Rourke could better  
9 respond to the details.

10 WITNESS O'ROURKE:

11 A I have got to check some  
12 things.

13 WITNESS DAU:

14 A While Mr. O'Rourke is  
15 checking the numbers, on drawing 1D-0211-1011 indicates  
16 that the pipe from Milepost 440 to 475.5, which is  
17 the crossing of the Peel River, that that pipe arrives  
18 by barge to the stockpile point at River Milepost  
19 950, and then is trucked by the Dempster Highway and  
20 winter road into the pipeline right-of-way.

21 Q Did you say 1D or 1B?

22 A 1D.  
23 an  
24 I'm sorry, it is/all weather  
25 road from the Dempster Highway, going into station  
26 1A-10A.

27 MR. VEALE: I'm sorry, I can't  
28 find that particular map?

29 Q Is it in the interior  
30 route volume or --

WITNESS WILLIAMS:



1 A Yes, it is in the alter-  
2 native corridor drawing Section 14.E110. It is a  
3 little more than half-way through that book of maps.

4 THE COMMISSIONER: What's the  
5 number of the map again?

6 WITNESS DAU:

7 A 1D-0211-1001.

8 THE COMMISSIONER: 1D?

9 A Yes, sir.

10 MR. VEALE:

11 Q Could you repeat that again  
12 so I could just see what you meant?

13 A Yes, at the right hand  
14 side of the sheet, the Peel River Crossing, there's  
15 a stockpile site called RMP 950, River Milepost 950.  
16 And the note below that says that the pipe is laid,  
17 "Stockpile site RMP 950, camp and date, then pipe  
18 laid from Milepost 475.5 to Milepost 440".

19 THE COMMISSIONER: It's the map  
20 right after the one you referred to , Mr. Veale.

21 MR. VEALE: Yes, I have it,  
22 thank you.

23 A And its access is by barge.

24 MR. VEALE:

25 Q Does that indicate then  
26 that proceeding west from there the access will not  
27 be by barge?

28 A Yes, it indicates the  
29 pipe will arrive at that location by barge and will  
30 be trucked, as you can see by the Dempster Highway,



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1 and the permanent road that goes into Milepost 448  
2 on the interior route, and it indicates that the pipe  
3 that's barged to that location would be laid between  
4 Milepost 440 and Milepost 475.5.

5 I'm talking about barging on the  
6 Mackenzie and Peel River.

7 Q Do I understand you correctly then, that once you go west of Milepost 440,  
8 it's no longer barged in, is that right?  
9

10 A That I believe is my understanding, but Mr. O'Rourke likely found the --  
11

12 WITNESS O'ROURKE:

13 A I apologize for having to  
14 track through this, but under the pipe routing plan  
15 that we incorporated in this report, we have pipe for  
16 the Canadian side of the Alaska -- or the Prudhoe  
17 Bay lateral, interior route, flowing through Hay River,  
18 being barged to Arctic Red River, trucked from there  
19 to a stockpile, temporary stockpile point at Mile  
20 286 on the Dempster Highway. This is an all weather  
21 movement, and after that it would be trucked over  
22 winter roads to three points along the right-of-way,  
23 one of which would be that point, Milepost 335 on  
24 the pipeline.

25 Q I see. In other words,  
26 the entire pipe for the Prudhoe Bay interior route  
27 would actually come through Hay River?

28 A In this set of circumstances,  
29 yes.

30 Q I see.



1 A We talked yesterday of  
2 other options, but --

3 Q Right. No, but that is  
4 the way it's presently planned?

5 A Yes.

6 MR. MARSHALL: That is within  
7 Canada I think, is it?

8 A Right, on the  
9 Canadian side.

10 MR. VEALE:

11 Q Was there any consideration  
12 -- what report are you reading from, Mr. O'Rourke?  
13 That would be of some assistance.

14 A I'm reading from Volume  
15 3 of the C.N.-C.P. logistics report, I believe they  
16 are referenced somewhere.

17 Q In that report, and in  
18 the research work that you've done with respect to  
19 the shipment of pipe to location, and specifically  
20 on the interior route, did you actively consider  
21 bringing the pipe through Skagway, Whitehorse and up  
22 the Dempster Highway?

23 A If I recall the answer is  
24 yes. We had this option built into the linear pro-  
25 gramming models I referred to yesterday. We had this  
26 route set up so that if ships -- if the combination  
27 of prices over the various segments of the routing  
28 alternative, if they favoured the routing over Skagway-  
29 Whitehorse, then that route would have been used.

30 But as I said earlier,





1 working with the set of costs that we had, the routing  
2 alternative chosen by the model and which we support,  
3 routed the material through Arctic Red River.

4 Q Well, did you in fact do a  
5 cost estimate of taking the pipe through the Skagway-  
6 Whitehorse-Dempster Highway route?

7 A I'd have to -- I guess the  
8 answer to that is yes, because within the model there  
9 are cost estimates for the shipping portion from Japan  
10 to Skagway, a dock charge at Skagway, a rail charge  
11 to Whitehorse, a stock piling cost at Whitehorse, a  
12 trucking cost from there up to Dempster. All of these  
13 cost numbers are in the model, and when the model  
14 chooses a route, it would compare the alternatives  
15 and choose that which is most economical.

16 So in the process of arriving  
17 at this routing, it would have compared the White Pass  
18 and Yukon route, say, to the Mackenzie Valley.

19 Q Now, this model that you  
20 are referring to, is that incorporated in the  
21 document before you now that you've been referring  
22 to?

23 A It would depend on your  
24 definition of the model. There is a description of  
25 the model given in Volume 2, it describes what the  
26 model does. But the model, say the computer program  
27 is not in the books, no.

28 Q I appreciate that. Your  
29 position then is that from your knowledge of this  
30 report, is that it is in fact cheaper to go through



1 Hay River than it is to go through Skagway and White-  
2 horse, is that correct?

3 A Based upon the set of cost  
4 elements that we used and which, in our opinion, were  
5 valid and defencable.

6 Q Now, was one of those  
7 elements an assumption that you were going to have a  
8 Canadian source of supply of pipe?

9 A As it happens, and this  
10 is one of the things I was checking, in that portion  
11 of the line that we're talking about, it turns out  
12 that there is both Canadian and off-shore pipe being  
13 delivered into there, and both of them are moving via  
14 Hay River, Arctic Red and then on.



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1 Q So your position then is that  
2 even taking an offshore supply of pipe, it is cheaper  
3 to bring it to Vancouver and rail it to Edmonton and  
4 send it up that way.

5 A And barge it  
6 up, yes.

7 Q It is.

8 A That's the way it  
9 worked out. Now, I said yesterday and I can repeat again  
10 when it comes down to competitive bidding, the situa-  
11 tion may change. We keep the option identified, we  
12 consider it to be viable, ultimate selection will  
13 depend on prices, final prices. But with the set of  
14 numbers that we used, the cheaper route was via Hay  
15 River.

16 Q So there never in fact  
17 bidding  
18 has been a competitive /situation so you could make that  
19 determination, is that correct?

20 A We have not had competi-  
21 tive prices from any of the modes used in any of the  
22 analyses, so that they are somewhat comparable in that  
23 they are non-competitive. They are price indications.  
24 They are good.

25 Q well, are they realistic?

26 A If anything, they are a  
27 shade high, which is generally the case when you go  
28 out for price indications, cost indications, whatever.

29 Q Well, it strikes me  
30 that in waiting for competitive bidding, you're going  
to run into some problems because the Hay River route



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1 requires a certain additional capacity in barges and  
2 tugs. Now at some point it seems to me you would have  
3 to make a decision and make it in advance so that you  
4 could actually pursue the best route. Now what are the  
5 factors involved in that consideration?

6 A We  
7 have advised Arctic Gas just as you're saying, that they  
8 should be talking with the carriers to choose the rout-  
9 ing, but this also involves the knowledge as to where  
10 materials are going to originate, and this they  
11 don't know very well yet either, I don't think. There  
12 is a point in time when they will have to decide what  
13 routing they are going to use, Say, to get to Old Crow  
14 if that's the one we're talking about, and when they make  
15 that decision in the process of arriving at it they  
16 will have to come to terms on cost or prices for  
17 service by the carriers.

18 WITNESS WILLIAMS: That  
19 situation, though, wouldn't be as critical on the  
20 interior route which is constructed in the third  
21 year. The river equipment is needed for the balance  
22 of the system prior to that time.

23 Q Right, I appreciate that,  
24 it means then that you have a certain degree of  
25 flexibility on the interior route that you do not  
26 have on the route down the Mackenzie.

27 WITNESS O'ROURKE: I don't  
28 know whether I agree with that or not. I think that  
29 even on the coastal route, whatever barging equipment  
30 you require for the first and second years could be





Dau, O'Rourke, Williams  
Cross-Exam by Veale

1 put to good use in the third year. You do have some  
2 choices on the coastal route even.

3 Q Well, that raises a  
4 good point because it's conceivable that once Canadian  
5 Arctic Gas commits itself to the barging system it  
6 will be tied into the barging system because of the  
7 cost commitment to it. Is that possible as well?

8 A Because of which?

9 Q Well, simply because  
10 there will be such a cost involved in increasing  
11 the barge system that they will have no alternative  
12 but to take advantage of it in spite of the fact that  
13 another route may in fact cost cheaper.

14 A It is true that they  
15 will be committed to the system, but I think in the  
16 process of selecting that system there will be a  
17 pretty good assessment of the likelihood of somebody  
18 coming along later with a better offer, and my  
19 judgment right now, under the circumstances that  
20 prevail, the barging is the preferred mode.

21 Q I see. Is it generally  
22 correct in taking cost estimates of transportation that  
23 ocean-going travel, anything you can send by ocean  
24 freight is going to be much cheaper than either rail or  
25 trucking by land?

26 A I don't -- I'm not too  
27 sure where ocean competes with rail in the model. If  
28 you're talking deep water ships, the ships don't  
29 go up into the Arctic.

30 Q No, I'm assuming now



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1 it's still a Skagway docking point, which would be a  
2 deep water ship.

3 A But I don't know that  
4 a ship arriving at Skagway is competing with what?

5 Q Well, it's competing  
6 with rail from Vancouver.

7 A No, because when the ship  
8 gets to Skagway the pipe still has to go somewhere.  
9 You have a ship move to Skagway, you have a ship move  
10 to Vancouver. From both of those ports you have a  
11 continuation to make. One of the points that --

12 Q But surely you can  
13 separate the 35 mile railway from a 2,000 mile railway  
14 and that would be about the difference between the  
15 Skagway Railway and the Vancouver to Hay River rail-  
16 way.

17 A But it isn't entirely  
18 railway. Skagway, as I understand it, is not well  
19 equipped for handling shiploads of pipe, and in our  
20 conversations with the White Pass & Yukon Railway they  
21 warned us, alerted us, advised us that there would be  
22 some dock improvements required before they could  
23 handle large quantities of pipe through that dock.  
24 On the other hand, the Port of Vancouver can take a  
25 shipload of pipe today.

26 Q Yes, on the other  
27 hand too, Hay River is going to require vast improvement  
28 to take that amount of pipe as well.

29 A Yes.

30 Q Now, we have been



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1 speaking about delivery of pipe. Now let's change the  
2 focus to other equipment and supplies. Does that  
3 change the cost estimate picture? I'm assuming that  
4 no change is required in docking facilities and this  
5 sort of thing.

6 A You're talking of the  
7 delivery of other materials and supplies from where  
8 to where?

9 Q I'm assuming you're  
10 supplying the interior route now.

11 A O.K.,

12 Q And we're trying to  
13 determine the trade-off between barging down from  
14 Hay River and taking the Skagway-Dempster Highway route.

15 A O.K. The fuel require-  
16 ments for the interior route in our judgment at this  
17 time would have to be supplied from Edmonton, and that  
18 would require movement via Hay River, we feel. The  
19 contractors' equipment and camps for the interior  
20 route would come from several points along the  
21 Mackenzie River by way of a transfer. So they are  
22 just not able to move via the Dempster route, from the  
23 south end of the Dempster, that is. Compressor stations,  
24 the small amount that there are, generally come from  
25 Eastern Canada or Eastern U.S. and would probably route  
26 through Edmonton-Hay River. A lot of the lesser  
27 pipeline materials would route somewhat the same way,  
28 coming from the east up through Edmonton and Hay River.

29 In general, I think it's  
30 mainly the pipe that you tend to look at as being able



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1 to move via either route. Does that answer your  
2 question?

3 THE COMMISSIONER: "It's mainly  
4 the pipe that you would tend to look at in the move  
5 via either route." Now when you say that, are you con-  
6 fining yourself to the interior route from Alaska to  
7 the Travaillant Lake, or the North Slope route, the  
8 prime route or do you mean the whole of the trunk  
9 pipeline down to say Fort Good Hope?

10 A Now in this instance I  
11 was referring to the transportation route that would  
12 be followed for delivering pipe required in the  
13 Canadian portion of the interior pipeline system.

14 Q Right.

15 A Interior route.

16 Q The interior route?

17 A Yes.

18 MR. VEALE: Q And in coming  
19 to the conclusion you did in the previous question,  
20 the prime factor, you say, was that the fuel originates  
21 in Edmonton, is that correct?

22 A At the time we put our  
23 report together, and it may still stand, the most  
24 likely place where fuel could be purchased for the  
25 project would be in Edmonton. We did not feel that  
26 there would be any amount of fuel available in Van-  
27 couver, say, for transport up the coast.

28 Q You are aware that there  
29 are facilities to do that but you're just saying the  
30 volume of fuel required will probably be better out





Dau, O'Rourke, Williams  
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1 of Edmonton than out of any other source, is that  
2 correct?

3 A Yes, the White Pass &  
4 Yukon have told us that they are the what, franchise  
5 distributors in the Yukon for Standard Oil. We know  
6 that the system is used. We know that it's used for  
7 today's volume, for today's requirement in the Yukon.  
8 But it wasn't so much a case of limited capacity of  
9 the system as one of, where would the fuel come out  
10 of the refinery?

11 Q sorry, where would --

12 A Which refinery it would  
13 come from, and if you will recall when we put this  
14 report together, this was a year or so ago, there was  
15 an energy shortage and the most likely place at that  
16 time was Edmonton for fuel.

17 Q So from what you've  
18 said, if I may sum up and put this to you, it appears  
19 to me that there's a lot of work to be done before  
20 Canadian Arctic Gas makes its final decision as to  
21 which route is going to be the most economical route,  
22 and I include the pipe, I'm mainly speaking of the  
23 pipe. Is that right?

24 A Yes.  
25  
26  
27  
28  
29  
30



1 MR. VEALE: MR. Commissioner,  
2 I've sort of completed my cross examination to this  
3 point, and I just wanted to have the ground rules  
4 clear for our return to look at the two sites, the  
5 two camp sites that are going to be provided for us  
6 in greater detail, and I just wanted to have the  
7 understanding that I assume I would be able to have  
8 a broad cross-examination on those spread camps, as  
9 I have had generally throughout. Is that a fair  
10 assessment of the situation?

11 THE COMMISSIONER: Yes, I think  
12 so. You're really saying to me that you haven't  
13 finished your cross-examination, and when you resume  
14 it, whenever that may be, after that material has been  
15 supplied in connection with the two camps, well as  
16 far as I am concerned, you have the right to cross-  
17 examine as if that material were here today and you  
18 were just going to carry on.

19 MR. VEALE: Thank you, sir.

20 THE COMMISSIONER: Well, we  
21 will take a five minute break for coffee and then  
22 carry on for a while longer.  
23

24 (PROCEEDINGS ADJOURNED)  
25

26 (PROCEEDINGS RESUMED PURSUANT TO ADJOURNMENT)  
27

28 CROSS-EXAMINATION BY MR. HOLLINGWORTH:  
29

30 Q Mr. Dau, in your canned evidence



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1 which was presented yesterday on page 2, you speak  
2 of substantial financial commitments being required  
3 for critical items. Are these substantial commitments  
4 to be from the applicant, sir?

WITNESS DAU:

A are they to be --

Q From the applicant?

A Yes.

9 Q So that I take it that  
10 the -- for instance, the barge and tug contractors  
11 on the Mackenzie system would not be prepared to go  
12 ahead with any building whatever, unless they had a  
13 commitment presumably in writing from Canadian Arctic  
14 Gas that their services would be utilized?

15 A That's my understanding,  
16 but you should speak to a policy witness of Arctic  
17 Gas on that, sir.

18 Q I assume the same consider-  
19 ations would prevail with wharves, communication  
20 facilities and logistics, to the best of your know-  
21 ledge?

A That's correct, sir.

22 THE COMMISSIONER: What page  
23 was that on?

24 MR. HOLLINGWORTH: That was on  
25 page 2, at the top, sir.

26 Q And are you aware of the  
27 location for building of the new equipment that would  
28 be required on the Mackenzie system? Perhaps Mr.  
29 O'Rourke is better prepared for a question like that.  
30



1 WITNESS O'ROURKE:

2 A I missed the first few  
3 words of your question.

4 Q Where would the new equip-  
5 ment required on the Mackenzie system, where would it  
6 be manufactured?

7 WITNESS DAU: A You mean the barges and  
8 tugs?

9 Q Yes, that's correct.

10 WITNESS O'ROURKE: A I don't think this is a  
11 question I can answer with certainty at this point.  
12 We recommended to Arctic Gas that they would have to  
13 buy some equipment, and left it to them to negotiate  
14 for it.

15 Q So --

16 A I understand they are  
17 talking, but I don't know where it will be manufact-  
18 ured.

19 Q So in the scope of your  
20 study, you haven't gone into how much lead time would  
21 be required?

22 A The lead time that we got  
23 into in our study envisaged that the tugs and  
24 barges would have to be built on the west coast,  
25 either Vancouver or Victoria.

26 Q And did you study what  
27 lead times would be required?

28 A Yes, sir.

29 Q And how much are they?

30 A approximately 24 months





1 from the day on which commitments were made or the  
2 contract was signed between Arctic Gas and whichever  
3 operator was going to have the equipment built for  
4 it. In other words, if it was N.T.C.L., it would have  
5 to be 24 months from the day that Arctic Gas made  
6 their contract with N.T.C.L.

7 is  
Q And this/on the assumption  
8 that the barges and tugs would be manufactured on the  
9 west coast?

10 A Yes, sir.

11 Q So that if they were to  
12 be manufactured elsewhere, then you might need a  
13 longer or a shorter lead time?

14 A Perhaps.

15 Q Because of transporting it  
16 to Hay River after you've got it manufactured, is the  
17 thrust of my question?

18 A Well one of the difficult  
19 parts is not so much -- well, transportation puts  
20 something in the cycle, but there are some critical  
21 components in the tugs. The reduction gear, I believe  
22 they are, that have long lead times themselves, and  
23 these contribute to the long lead time that you need  
24 for the entire fleet.

25 So if you were, by some bit of  
26 magic could fabricate these units in Edmonton, you  
27 would still have to commit long in advance because of  
28 the reduction gear aspect.

29 THE COMMISSIONER: Well, the  
30 enlarged N.C.T.L. fleet of barges, the assumption has



1 been that those barges would be manufactured, built  
2 on West Coast shipyards, is that -- and then trans-  
3 ported through the Bering Strait and around through  
4 the Arctic and up the Mackenzie?

5 A That is the assumption  
6 that's included in our estimates right now.

7 MR. HOLLINGWORTH:

8 Q Have you just assumed that  
9 West Coast shipyards could do this manufacturing, or  
10 have you actually engaged in studies to see if they  
11 would have this capability within the lead times you've  
12 given?

13 A We pointed out to Arctic  
14 Gas that this item of equipment had a long lead time  
15 on it, and we recommended that they get an independent  
16 appraisal from someone who's more <sup>marine</sup> inclined than we  
17 were, or marine knowledgeable than we were, put it  
18 that way.

19 Arctic Gas did have this study  
20 done, done through Northern Engineering. It was done  
21 by an outfit called Incan, and they canvassed the  
22 shipyards around the world, to see whether they could  
23 be built elsewhere. They concluded that the units  
24 would -- within the conditions at the time of their  
25 examination, that the west coast was the preferred  
26 place.

27 THE COMMISSIONER: That's the  
28 west coast of Canada, is it?

29 A Yes, sir.

30 Q Vancouver and Victoria?



1 A Yes, sir.

2 MR. HOLLINGWORTH:

3 Q Mr. O'Rourke, as I under-  
4 stand it, you're not an employee of Northern Engineer-  
5 ing, nor are you an employee of Canadian Arctic Gas,  
6 but rather Canadian National Railways?

7 A Yes, sir.

8 Q And the evidence which was  
9 presented yesterday by your panel states on page 4  
10 that Canadian Pacific and Canadian National were  
11 retained in January of 1973 by Northern Engineering.  
12 Is it your retainer that's being spoken of in that?

13 A Pardon me?

14 Q Is it your retainer that's  
15 being spoken of in that sentence?

16 A Yes, sir.

17

18

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Dau, O'Rourke, Williams  
Cross-Exam by Hollingworth

1 Q Have you in fact been  
2 working on this project prior to that?

3 A Yes sir.

4 Q And who were you retained  
5 by at that time?

6 A The work that we were  
7 doing by ourselves, that is Canadian National, we  
8 were doing for the former Gas Arctic Group, we were  
9 a member of that group at that time.

10 Q So in essence  
11 you continued at the time that Northern Engineering  
12 came along in January of 1973 and retained you, is  
13 that a fair statement? Your retainer was in essence  
14 continued by Northern Engineering.

15 A Canadian Pacific also  
16 came into the picture at that point, or just prior to  
17 that.

18 Q Are all the facts and  
19 figures which you're presenting today as a result of  
20 a study jointly with Canadian Pacific, because I notice  
21 they don't have a representative on the panel.

22 A Just to explain, the  
23 linear programming model that I referred to, we in C.N.  
24 retained proprietary rights to that, but we did use  
25 the model to develop the cost in the reports, some of  
26 the costs.

27 Q But Canadian Pacific has  
28 no outlet to Hay River, has it?

29 A That's right.

30 Q It's only Canadian National





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1 that does.

2  
3 A Yes sir.

4 Q Does Canadian Pacific  
5 actually extend north of Edmonton?

6 A Through their joint  
7 ownership of the Northern Alberta Railway, their service,  
8 if you will, can reach as far as Roma Junction, which is  
9 just near High Level -- Peace River, pardon me.

10 Q What was the specific  
11 assignment given to you by Northern Engineering in  
12 January of 1973?

13 A Can I read off what  
14 was read yesterday?

15 Q That's it in a nutshell,  
16 is it?

17 That's it.

18 Well, let me rephrase  
19 that. Your study was to extend beyond the Canadian  
20 National system, I take it.

21 A Yes sir.

22 Q Or the Canadian Pacific  
23 system.

24 A Yes sir.

25 Q Is Northern Engineering  
26 being charged a fee for your services?

27 A Yes sir.

28 Q And in the event that  
29 your company's routes are favored over those of other  
30 companies, are there any economic considerations given  
by way of rate structure to the shippers?



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1  
2 A Would you repeat that  
3 again, please?

4 Q well, let me break it  
5 down to a few points. You've got published rates that  
6 railways work under, is that right?

7 A yes sir.

8 Q And you've used these  
9 and comparative cost studies with other routes such as  
10 the one Mr. Veale was discussing with you earlier on  
11 over the White Pass & Yukon Railway. Is there any  
12 possibility of a reduction in these tariff rates being  
13 given in the event that a contract is let to Canadian  
14 National rather than to take a shorter route?

15 A The rail rates that we  
16 have used in our study was put together by both C.N.  
17 and C.P. rate sections in Montreal. They were agreed  
18 upon by the two railways. I am not -- this is a difficult  
19 area -- I'm not too sure if we would get into a bad  
20 situation. Let me think about that.

21 Q In your comparative  
22 studies where you come up with a conclusion that  
23 economically it is more viable to go through Hay River  
24 than through say Skagway over the White Pass & Yukon  
25 Rail way are you using the published tariffs that are  
26 now available that are used by all railways?

27 A There are no published  
28 tariffs from a point like Welland, say, to a point  
29 like Hay River because that move has not existed until  
30 now. So we've had to get from the Rates Departments



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1 in both railways a scale of rates that is compatible  
2 with the type of rates that they would publish, or  
3 is the same as what they would publish if they were  
4 formally asked to produce these rates.

5 THE COMMISSIONER: Well, don't  
6 you have rates from Edmonton to Hay River?

7 A We have --if a move has  
8 happened from Edmonton to Hay River, we would probably  
9 have a rate. I can think of the <sup>pipe</sup> that moved either  
10 for the Sans Sault or the Inuvik test-site, one of  
11 them moved by rail, I believe, and in the process of  
12 moving by rail that created a rate. But there has not  
13 been a pipe move from Welland, say, to Hay River.  
14 To my knowledge there has not been a pipe move from  
15 Vancouver to Hay River, so there has not been a  
16 necessity for quoting a rate between those points.

17 Q Well, aren't rates  
18 determined basically by the cost per mile of shipping  
19 something?

20 A I think I've run out of  
21 expertise on this, quite honestly. I'm not a rate man.

22 MR. HOLLINGWORTH: Q Well,  
23 isn't there a rate in existence from Welland to  
24 Edmonton, say?

25 A Pardon me?

26 Q Isn't there a rate in  
27 existence for pipe from Welland to Edmonton, for  
28 instance?

29 A I don't honestly know.  
30



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1 Do you want me to find out for you?

2 Q Yes, if you wouldn't  
3 mind, please.

4 THE COMMISSIONER: You asked  
5 CP and CN to simulate rates for pipe then, did you?  
6 Do I understand you?

7 A Yes sir, we had to have  
8 rail rates from Welland to points Edmonton and north,  
9 and to a few points around the prairies.

10 Q Well, did they simulate  
11 it jointly, or did they each go off by themselves and  
12 come back and --

13 A Their method is to each  
14 put together a scale of rates and then get together,  
15 compare their joint proposals, compromise as required,  
16 and issue a scale of rates to which they both sign.

17 Q So you get one rate out  
18 of C.N. and C.P.

19 A Yes.

20 Q So the fact that the two  
21 might have come in with different rates is out of the  
22 picture by the time they get together with the customer,  
23 is that right?

24 A This is standard practice.

25 Q No, but I'm just asking  
26 you the question. Do I understand your answer to be  
27 that Canadian Pacific and Canadian National get together  
28 in private, compare the rates that they have got apart  
29 and arrived at separately, then do a little compromising  
30 and come up with a single rate and go to the customer?





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1 Is that what I understood your answer to be?

2 A Yes.

3 MR. MARSHALL: Well, Mr.  
4 Chairman, this witness has said he's not an expert on  
5 how the railroads determine their rates. There is a  
6 question of regulation of rates of railways and so on.

7 MR. HOLLINGWORTH: Mr.  
8 Marshall, I don't want to cut you off but I'm not  
9 going to pursue it any further, so you don't have  
10 to concern yourself.

11 THE COMMISSIONER: C.N. and  
12 C.P. can take care of themselves.

13 MR. MARSHALL: I'm sure  
14 they can.

15 (LAUGHTER)

16 MR. HOLLINGWORTH: They always  
17 have, they demonstrated that capacity in the past.

18 Q Now continuing with you,  
19 Mr. O'Rourke, on page 3 of the evidence which was  
20 presented yesterday, it's stated at the bottom,

21 "The Section from Richards Island to the  
22 Mackenzie River crossing near Fort Simpson  
23 will require about 950, 000 tons of material  
24 and equipment to be moved in support of the  
25 two winter construction seasons."

26 Looking at also the material handed out yesterday as  
27 a single sheet called

28 "Classification of material tonnages to be  
29 transported in Canada north of the 60th Parallel";  
30 -- do you have that document, sir?



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1 I add up the totals for  
2 '76, '77, and '78 and we can ignore for the moment what  
3 years they would be, let's call them the first three  
4 years, and come up with a figure of 1,358,000 more  
5 or less.

6 A Yes.

7 Q Has that entire 950,000  
8 tons been moved in in that time? Is that included in  
9 this larger figure?

10 A Offhand I would think so.

11 Q So that there 's another  
12 400,000 tons in addition to the material required for  
13 the Richards Island to Fort Simpson leg.

14 A No, I think this table  
15 here includes a portion of the Prudhoe Bay lateral.

16 Q No, that's what I said,  
17 I'm sorry. I'm not speaking very clearly today, I  
18 recognize that. I said that there is another approxi-  
19 mately 400,000 tons shipped in, that's in addition to  
20 what is required between Richards Island and Fort  
21 Simpson.

22 A Yes.

23 Q And is that -- does that  
24 represent the requirement for the Prudhoe Bay leg?

25 A I don't know if I can  
26 be precise on the numbers. In general I would say that  
27 the 400,000 that you're looking at is associated with  
28 the Canadian portion at Prudhoe Bay Lake.

29 Q Then there is a figure  
30 for the next year, 1979, of 475,600, which includes



Dau, O'Rourke, Williams  
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1 a substantial amount of pipe. Where basically is that  
2 tonnage going?

3 A That is for the Prudhoe  
4 Bay link.  
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6  
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O'Rourke, Dau, Williams  
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1 I am wondering if we are  
2 not getting tangled up a little bit here by that 950  
3 thousand tons covering only from Richards Island to  
4 the Mackenzie River crossing, there is still some  
5 tonnage from that crossing to the border, the 60th  
6 Parallel, and I think that that tonnage is in this  
7 other statement.

8 THE COMMISSIONER: What is the  
9 statement you're looking at now, Mr. O'Rourke?

10 A It's one of the view graphs  
11 that was presented yesterday.

12 MR. HOLLINGWORTH: It was given  
13 out yesterday, sir, it's a figure --

14 THE COMMISSIONER: This is it,  
15 isn't it?

16 MR. MARSHALL: I believe it's  
17 Exhibit 110.

18 MR. HOLLINGWORTH: 110, Mr.  
19 Marshall?

20 MR. MARSHALL: I think so.

21 MR. HOLLINGWORTH:

22 Q Well, what is the tonnage  
23 required on the Alaska-Yukon -- from the Alaska-Yukon  
24 border to the main line at Travaillant Lake?

25 I have here a figure of 468,000  
26 tons. Would you agree with that?

27 A One of us got a couple of  
28 digits backwards. Wait til I do it again. You're  
29 right.





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MR. HOLLINGWORTH:

Q Well that figure is very close to the figure on this Table of 475,000 tons given in 1979. Is that purely by coincidence, or would most of the Prudhoe Bay lateral material be moved in in that year?

A There's an overlap here, I think on years. If you'll refer to -- the view graph in the years '78 and '79 is moving material for the Prudhoe Bay lateral, whereas on the page in the exhibit or in the application, the columns are headed '77 and '78. I would guess it's more coincidence than anything that there's a similarity.

Q Has a tonnage been worked out for the Prudhoe Bay lateral in the event the interior route is used?

A Yes, sir.

Q Are you aware of what it is?

A I'm not sure whether this will come out quickly or not. It will take me a little time to do it. Do you want me to do it now or later?

Q No, that's fine, leave it for now. Are you aware whether it would be more or less or approximately the same though?

A I think it's a little more.

Q I believe in your responses to Mr. Veale you said that that would be shipped into Hay River, then down the Mackenzie system to Arctic



1 Red River, and then over the Dempster Highway, is that  
2 right?

3 A For the Canadian portion?

4 Q For the Canadian portion?

5 Which would be for slightly more than -- or more than  
6 468,000 tons. Is that right? That's what you have  
7 said.

8 A When you were asking me  
9 before whether it would be more or less tonnage,  
10 the interior coastal -- coastal versus the interior,  
11 I was picturing the total mileage for that lateral.  
12 And I said that I felt there would be more tonnage on  
13 the coastal route than on the interior, but that is  
14 for the total mileage -- or vice versa, I'm sorry.

15 I felt there would be more  
16 tonnage for the interior route than the coastal, but  
17 I was including the total mileage of that lateral.  
18 What the tonnage break is at the Alaska-Yukon border  
19 and how it affects the comparisons, I can't give you  
20 a guess right now. I would have to do some work.

21 Q So you're now saying you  
22 don't know whether the tonnage is more or less for  
23 the interior route over the coastal route for the  
24 portions within Canada?

25 A That's right.

26 Q Were you planning to move  
27 the Alaskan portion of the coastal route along the  
28 Mackenzie system and along the coast?

29 A The Alaskan portion of the  
30 coastal route?



1 Q Yes?

2 A That would come in via  
3 the Bering Sea route in the plan we put together.

4 Q Now going back for the  
5 moment to the interior route, you told me and  
6 Mr. Veale that the unloading would be at Arctic  
7 Red River. Have plans, alternate plans been formulated  
8 the  
9 for/substantial wharf facilities that would be re-  
quired at Arctic Red River?

10 A Not in detail.

11 Q Has a location been form-  
12 ulated?

13 A No sir.

14 Q It's not known whether it  
15 would be at or near the community of Arctic Red River?

16 A Not at this time.

17 Q Do you know approximately  
18 how many people would be required at such off-loading  
19 facilities?

20 A At this point I would guess  
21 that the numbers would run about the same as other  
22 points along the river and that is ranging from 50  
23 to 100 men.

24 Q Well let me get this  
25 straight. At other points along the river, aren't  
26 you just unloading a single spread at a time?

27 A Where?

28 Q Well at any of the wharving  
29 sites up or down the Mackenzie, say at Fort Simpson?  
30 Are you not unloading material required for one



1 spread only?

2 A Some of the points along  
3 the river, where materials are to be delivered by  
4 barge will actually serve two spreads.

5 Q All right, two spreads.

6 A Now --

7 Q Would any of the points down  
8 the Mackenzie offload material for more than two  
9 spreads?

10 A I can't recall any.

11 Q How many spreads are there  
12 on the interior route?

13 A From the border --

14 Q From the Alaska-Yukon  
15 border to Travaillant Lake?

16 A I will have to check.  
17 Four.

18 THE COMMISSIONER: That's over  
19 the interior route, is it?

20 A The Canadian portion of  
21 the interior route, sir.

22 MR. HOLLINGWORTH:

23 Q So there are twice as many  
24 spreads being unloaded at Arctic Red River than at  
25 any other point along the Mackenzie River, is that  
26 right?

27 A At least one of the spreads  
28 has some of its material discharged at the projected  
29 stockpile point north of Arctic Red River.

30 Q One of the interior route





1 spreads?

2 A Yes, sir.

3 Q Has it stockpiles -- I'm  
4 sorry, would you repeat your answer?

5 A Spread D works immediately  
6 west of station MO3 on the interior route, and we  
7 plan to have a barge discharge point at what we  
8 referred to as River Milepost 902 or 905. That point  
9 is down-river from Arctic Red. That would be a point  
10 that would have been already established ahead of  
11 Arctic Red.

12 Arctic Red we see as a transfer  
13 point, not so much a stockpiling point.

14 Q Well it's still a fact  
15 that spreads for the interior route would be unloaded  
16 at Arctic Red River, isn't it?

17 A Yes, sir.

18 Q How many spreads? Are you  
19 now saying three or --

20 A I'm saying three and a  
21 bit.

22 Q Three and a bit.

23 A Equivalent to three and a  
24 bit.

25 Q And you said before that  
26 the tonnage required for the coastal route in Canada  
27 was 468,000 tons, and you weren't sure if the interior  
28 route was more or less in the final analysis, but  
29 let's for argument's sake say it's less, isn't it  
30 a fair statement that a very substantial tonnage is



1 being off- loaded at Arctic Red River in comparison  
2 to any other unloading facility down the Mackenzie  
3 River?

4 A It's a fair statement.

5 Q So isn't it a fair assumption  
6 ion that you would need more than the normal number  
7 of men to do this job?

8 A Not necessarily, the men  
9 wouldn't all necessarily be at Arctic Red River, because  
10 as I said it's a transfer point and not a stock-  
11 pile point. We envisage a straight transfer from  
12 barge to trucks and the trucks would move across the  
13 Dempster Highway to the west.

14 Q Well, do you mean to say  
15 that a truck could pull up, be loaded and be on its  
16 way in a minimum time span, but no one would be staying  
17 around this unloading site?

18 A The material would go from  
19 barge to truck, and the truck would go at least 30  
20 miles inland to stockpile points.

21 Q But I presume that a barge  
22 can unload many truckloads of material, can't it?

23 A You presume which?

24 Q That a barge can unload or  
25 carry many, many truckloads of material?

26 A Yes.

27 Q And I presume too, that  
28 the unloading of a barge would go more quickly than  
29 the reloading and taking away by truck?

30 A You could unload direct



1 from barge to truck.

2 Q There would be that number  
3 of trucks sitting there ready to go with this material,  
4 is this what you're saying?

5 A Yes.

6 Q Well let's get this truck  
7 onto the Dempster Highway. What are the load provisions  
8 on the Dempster Highway?

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Dau, O'Rourke, Williams  
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1                   A       It's our understanding  
2       that with the exception of a few bridges in the  
3       south end, the highway and the bridges will be built  
4       for 76,000 maximum gross vehicle weight.

5                   Q                   Do you know  
6       how much a vehicle capable of such gross weights would  
7       weigh as a net weight?

8                   A       In the area of 40,000  
9       pounds, depending on the type of trailer, type of  
10      tractor.

11                  Q       So by subtracting that  
12      from the gross vehicle weight you get 36,000 pounds,  
13      and I assume that would be its load capability.

14                  A       There must be something  
15      wrong with my numbers because I'm quite sure that  
16      some trailers are capable of hauling 40,000 pounds on  
17      roads like this.

18                  Q       Well, it's 40,000 at a  
19      maximum anyway, is it?

20                  A       At a maximum for this  
21      type of traffic, yes.

22                  Q       Now, what length will the  
23      pipe be that's transported in this fashion?

24                  A       I think we've already  
25      said they would be mainly 80-footers, but they could  
26      be some 40's and 60's.

27                  Q       Well, I understood the  
28      evidence in chief to say that 40-foot joints would be  
29      welded together at Hay River.

30                  A       Mr. Dau said that





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1 yesterday. I think he also said later in the day that  
2 there could be some 40's.

3 Q Would there also be  
4 80-foot joints coming through Hay River prebuilt that  
5 way? I'm sorry if I didn't understand that point  
6 yesterday, Mr. Dau. Are there 80-foot joints coming  
7 through as is from the factory?

8 WITNESS DAU: What I tried  
9 to explain was that it depends on the terrain. If you're  
10 in a mountainous terrain with very rugged relief, on  
11 the right-of-way, you would not utilize 80-foot pipe  
12 throughout. If you're on very level terrain, you would  
13 have a great desire to utilize the longest joint of  
14 pipe that you could get, that could be 80 feet.

15 Now the question as to whether  
16 all of the pipe is going to be 40, 60, 80, or what  
17 proportion, I don't think has been determined. I am  
18 pretty sure that there will be 40's, 60's, and 80's  
19 moving.

20 THE COMMISSIONER: You said  
21 yesterday, didn't you, Mr. Dau, that the capacity of  
22 the mill to manufacture 60 and 80-foot lengths is  
23 dependent on their using the spiral welding process.

24 A Yes sir. The 80-foot  
25 pipe, as I understand it, would have to be spiral  
26 weld pipe. It's my understanding that there are  
27 mills that can make 40 and 60-foot pipe with a  
28 longitudinal weld.

29 MR. HOLLINGWORTH: Well then  
30 would it be a correct assumption that 80 and 60 and 40+



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Cross-Exam by Hollingworth

1 foot lengths would all be moving down the Dempster  
2 Highway on truck?

3 A I would think so, yes.

4 Q Are there any length  
5 restrictions on the Dempster Highway, Mr. O'Rourke?

6 WITNESS O'ROURKE: Any restric-  
7 tions in the length of pipe you can carry --

8 Q On the total truckload,

9 A The overall length is  
10 probably an 80-foot limitation with some provision  
11 for getting overlength permits.

12 Q And would you be relying  
13 on getting over-length permits for the 80-foot joints  
14 that you were moving?

15 A I'm trying to recall.  
16 I know we based our trucking costs on the basis of  
17 hauling two 40's or one 80, but I can't recall if we  
18 specifically said to ourselves, "We would be  
19 hauling 80s" We did assume that there would be  
20 some 80-foot pipe hauled, that we would be able to  
21 get -- make arrangements with the Highway Authorities  
22 for this type of haul.

23 Q I think you just  
24 answered my next question. How many of these joints  
25 would each truck carry?

26 A We did our costing on  
27 the basis of hauling two 40's or one 80, which puts  
28 us within legal limits.

29 Q And what about 60?

30 A 60's we didn't cost.



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1 MR. HOLLINGWORTH: Mr. Commis-  
2 sioner, this might be a convenient time to cut off  
3 proceedings today, if you feel so inclined.

4 THE COMMISSIONER: We'll adjourn  
5 until nine o'clock tomorrow morning.

6 (PROCEEDINGS ADJOURNED TO APRIL 23, 1975)  
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